

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.

Aug. 6-20 French Gliding Competition at Clermont-Ferrand

Sept. 2-17.... International Concours Aviatique, Rotterdam

Sept. 8-10.... 1,000 Miles Race round Britain for the King's Trophy

Sept. Tyrrhenian Cup, Italy

Sept. Italian Grand Prix

Sept. or Oct. R.Ae.C. Race Meeting, at Waddon

Sept. 22 Coupe Deutsch (300 kil.)

Dec. 15-

Jan. 2 Paris Aero Exhibition

1923.

June International Air Congress, London

Dec. 1 Entries Close for French Aero Engine Competition

1924.

Mar. 1 French Aero Engine Competition.

Mar. 15 Entries close for Dutch Height Indicator Competition

EDITORIAL COMMENT.

WITH the passing of Lord Northcliffe, progress and advocacy for the million have lost a noble friend, whilst aviation in particular must for many years mourn the loss of this great enthusiast and far-seeing genius. It was to Lord Northcliffe's generous and timely support with prizes and journalistic publicity in the early days of aviation that the general public were in a measure led to understand the possibilities of the conquest of the air, and his sympathetic help in buoying up the efforts and hopes of those who at the time were struggling to create a real air industry, will be long remembered by many early workers. Speaking personally, from time to time, spontaneous communications from Lord Northcliffe of encouragement to continue the missionary aviation work which we had undertaken in the founding of *FLIGHT* (originally born ten years previously in our sister journal the *AUTO.*, founded in 1896, the same year as the birth of the *Daily Mail* in 1908 (the same year that *The Times* was acquired by him), were helpful in strengthening our sanguine views. In these various communications and interviews, the one thing that emerged conspicuously was the remarkable grasp which he had, not only in the abstract, but in detail of the subjects he discussed. Had Lord Northcliffe accepted the office of Air Minister in 1917, when it was offered him, there would have been a vastly different tale to tell long ere this, as to the position of aviation, both Service and Civil. But love of free expression and his political convictions at the time would not permit him to join himself to the Government and thereby fetter his patriotic journalistic campaigns, upon which he deemed it necessary to embark. That Lord Northcliffe should have closed his brilliant career at the early age of 57 is but an aggravation of the sorrow and sympathy that one and all must feel for the loss to the nation of so remarkable a fighter for, and champion of, the people. We submit the sincere and respectful sympathy to his widow and family of one who, with broken intervals, knew Alfred Harmsworth from the earliest days of *Answers*.

The C.A.A.B. Report.

In this issue of FLIGHT we publish a *résumé* of the first report of the Civil Aviation Advisory Board, the formation of which was first announced by the Secretary of State for Air, Capt. Guest, at the Air Conference held last spring. It will be remembered that the first task which was set the newly-formed Board was to go into the question of the cost and practicability of an Imperial Air Mail Service. This the Board have been doing, and this first report deals with the subject in considerable detail. Generally speaking, the findings of the Board are what might have been expected, although to us it appears that the estimates are somewhat pessimistic as regards the possible income that could be earned. Also the figures of cost appear on the heavy side, especially those relating to weekly services. It appears quite evident, however, that no very great reduction in these figures are to be looked for in the near future if the weekly service is adopted. As pointed out in the report, many of the expenses, such as those of ground organisation, etc., are more or less independent of the frequency of the service and the number of machines flying over the route. This, of course, increases the cost per trip, or per machine mile, enormously, and the only way of reducing the figure seems to be to adopt a more frequent service.

To do so, however, would be of little avail unless a much greater volume of traffic than that estimated could be obtained. How this is to be attained is open to discussion. To us it certainly appears that to charge 1s. for an ounce letter is not likely to lead to an increase over and above the 500 lbs. weekly estimated by the Post Office. On the other hand, a reduction, unless very drastic, is probably not likely to increase the number of letters to such an extent as to make up for the lower fee charged. It would appear that here, as in other cases where air mails have been suggested, the only way of making the undertaking come within sight of paying its way is to make it compulsory that all first-class mail must go by air. If that were done, assuming as correct the Post Office statement that 500 lbs. of letters weekly is about 5 per cent. of the total mail, and taking 25 letters to the lb., there would be available 250,000 letters per week, or 10,000 lbs. of mail. Seven machines, or, in other words, a daily service, would just about carry this amount, and, as the cost estimated for a daily service is about £1,000 per trip, a fee of 6d. would just make the service pay.

This is one way in which the service might reasonably be expected to become self-supporting in time. Looking at the problem from another point of view, it appears that the overhead charges given in the estimates are certainly on the heavy side, and

apparently Mr. G. Holt Thomas is of the same opinion, as he has signed the report with the very suggestive reservation "that the laying out and equipment of aerodromes should, on the score of economy and efficiency, be in the hands of the operating company, always provided that such work is done under efficient Government control, and that the Government has full power to take over aerodromes in case of Imperial emergency." In that way there is little doubt that many of the items relating to the ground organisation would be very materially reduced—a fact which would be felt instantly in the cost per trip.

Then there is the question of running costs. With the figures estimated by the Board we are not inclined to quarrel, but it should be kept in mind that, by the time any air mail scheme matures, the figures given, which, quite rightly, refer to present machines, engines, fuel, etc., will probably have been materially reduced, and that it is thus permissible to expect that running costs, depreciation, etc., will become lower.

In any case, as pointed out in the report, the saving in time, although important, is not the only, nor, indeed, the most significant, reason for the establishment of such an air mail service. Personnel would be kept employed, designing staffs would be retained at work, and progress generally would follow, apart from any immediate benefits which quicker communications would confer upon the Empire. We therefore trust that the Government may find it possible to act upon the recommendations of the C.A.A.B., and that steps may be taken at once to give effect to, at any rate, part of the scheme, even if the entire route from London to India cannot be included from the start. Incidentally, it would be interesting to know how much the air mail service between Cairo and Baghdad is costing the country as operated by the R.A.F.

The British Victory.

It is with the greatest satisfaction that we are able to record, elsewhere in this issue, the winning by Captain Biard of the Schneider Cup race at Naples. To us the victory is the more gratifying as we are, as has been repeatedly stated in these columns, firm believers in the possibilities of the seaplane. The bringing, next year, of the race to this country cannot fail to stimulate interest in the seaplane, and we offer our heartiest congratulations to Captain Biard, the Supermarine Aviation Works, and Napier on the splendid performance, expressing at the same time the hope that, when the Schneider race comes to be flown in this country next year, there will be at least three British machines ready to defend the Cup.

Inspector of Accidents

MAJOR J. P. C. COOPER, O.B.E., M.C., has been appointed Inspector of Accidents at the Air Ministry under the Air Navigation (Investigation of Accidents) Regulations, 1922.

R. M. Groves Aeronautical Research Prize—Award for 1921.

THE R. M. Groves Aeronautical Research Prize for the year 1921 has been awarded to Sqdn.-Ldr. Roderic M. Hill, M.C., A.F.C., Officer-in-Charge of the Experimental Flying Department of the Royal Aircraft Establishment.

This prize is awarded annually to the officer, non-commissioned officer or man who, in the opinion of the Air Council,

has done most during the preceding year to advance aeronautical science on the technical and research side.

A Monument to Latham

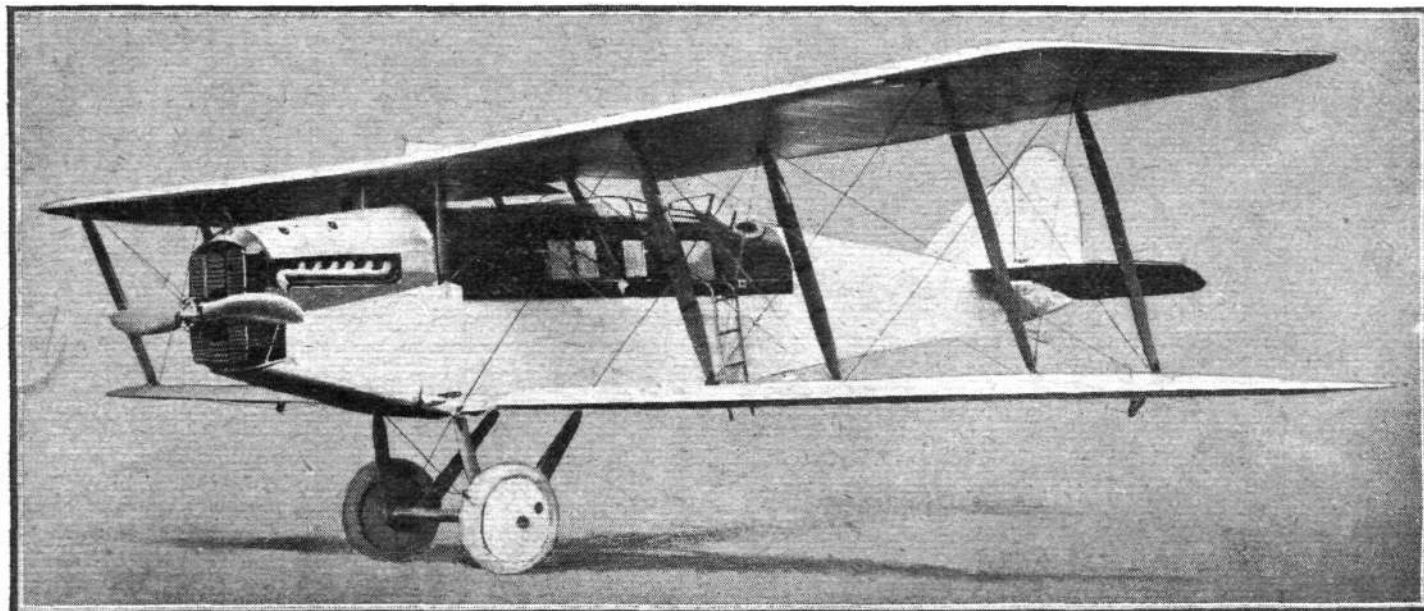
ON August 13 M. Fortaut, French Director-General of Aeronautics, M. Blériot, etc., were present when Comte de la Vaulx unveiled the monument at Cap Blanc Nez which has been erected to the memory of Hubert Latham, who will be remembered for his flying in England in the early days, and who made two attempts before M. Blériot to fly the Channel. In this he failed, and when rescued from the water on the second occasion, July 27, 1909, was calmly seated on his machine smoking a cigarette. Mr. Latham was killed in French Congo in 1912 whilst wild buffalo hunting.

A MARTINSYDE FOR NEWFOUNDLAND

The Type A, Mark II, Sold to the Aerial Survey Co.

At the last Olympia Aero Show there was, it may be remembered, exhibited, among other machines, a commercial aeroplane with seating accommodation for four passengers, in addition to the pilot. This machine was known as the type A, Mark II, and had a 275 h.p. Rolls-Royce "Falcon" engine. Recently, this machine has been purchased by the Aerial Survey Co., of Duckworth Street, St. John's, Newfoundland, for use in spotting for seals. During the last year or two, it will be remembered, Mr. F. S. Cotton and Mr. A. S. Butler, the latter of whom is now a director of the De Havilland Aircraft Co., have been doing some extremely useful work in Newfoundland, surveying, spotting for seals etc., the machines used being de Havillands and Westlands. The "stable"

The fuselage is a girder structure braced by tie rods except in the front bay, behind the engine housing, where bracing as well as covering is effected by "Consuta" ply-wood. The covering of the rear portion is fabric, doped with "Cellon" aluminium dope. The sides of the cabin top are of mahogany, and slope slightly inwards so as to bring the centre-section bracing outside the cabin. The space inside the cabin is divided into two by the seating arrangement, which consists of two pairs of side-by-side seats, the front one of which is reached by stepping over the back rest. In order to facilitate this somewhat acrobatic feat the roof of the cabin is hinged, as regards the rear portion, so as to lift up, while the front portion runs on guide rails and can be pushed forward out of



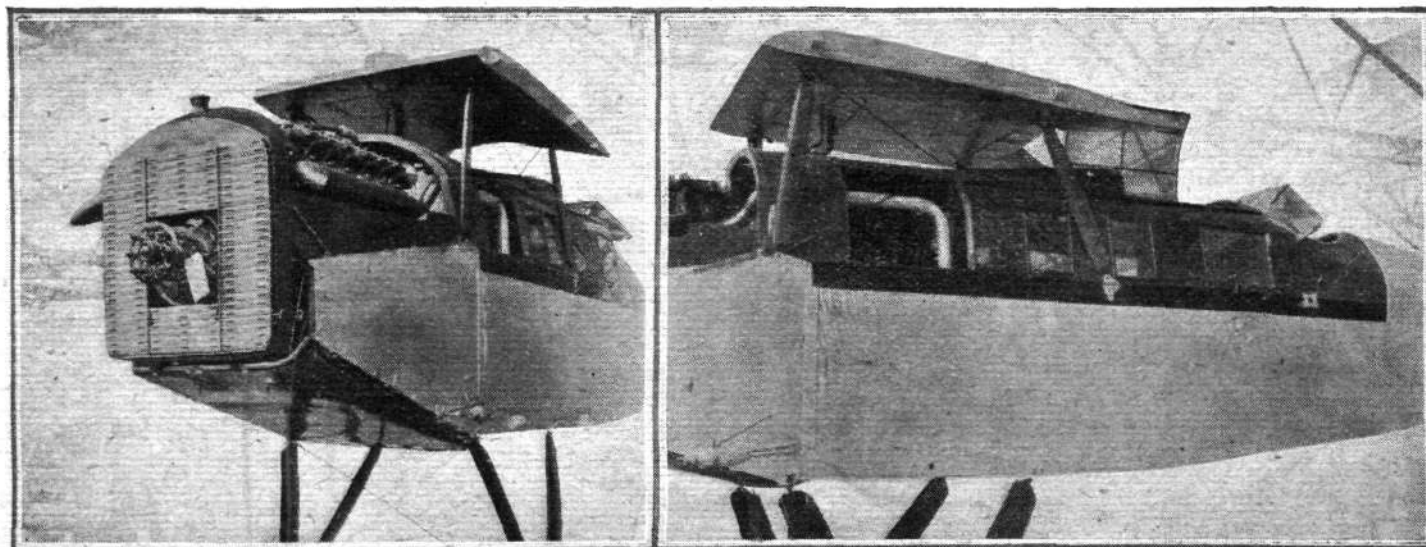
THE MARTINSYDE TYPE A, MARK II : Three-quarter front view.

will now be increased by the Martinsyde type A, Mark II, which has been specially fitted out for the purpose. Last week, through the courtesy of Mr. Tilghman Richards, of Martinsydes, we had an opportunity of examining the machine at the Woking works of that firm when the accompanying illustrations were obtained.

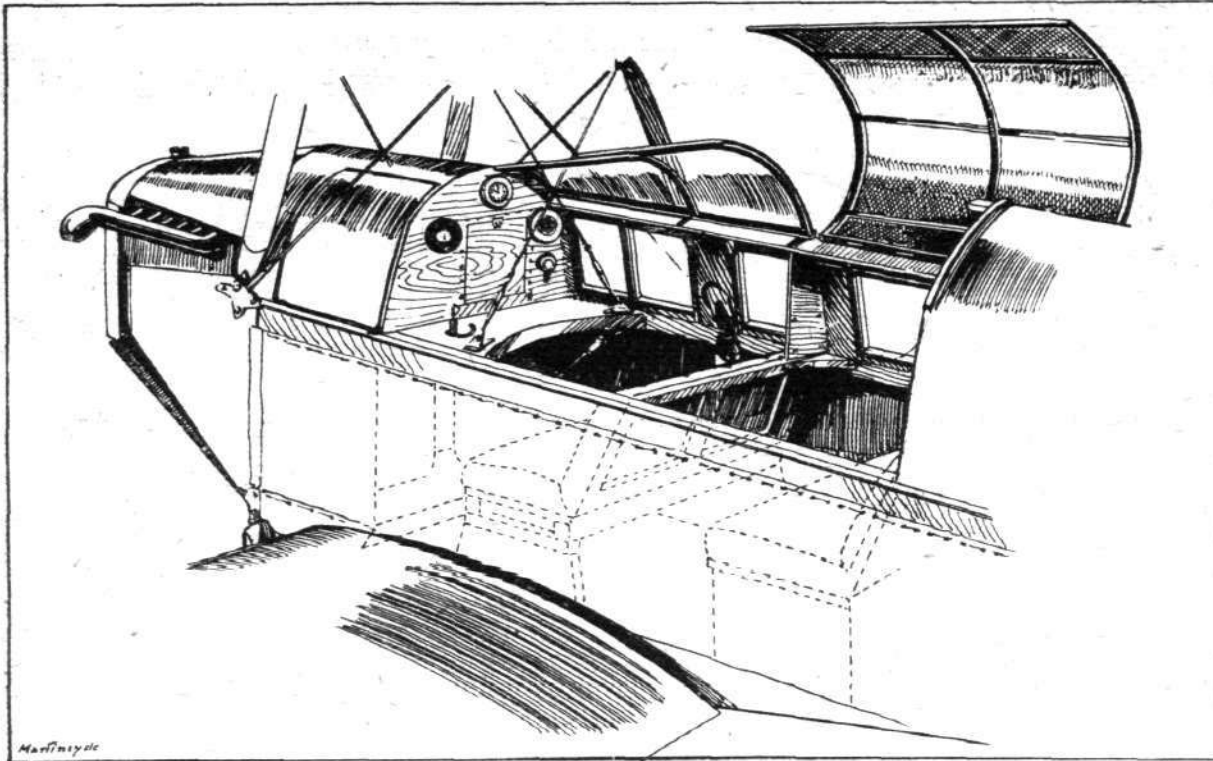
The Martinsyde A, Mark II, or A.II for brevity, is a tractor biplane resembling in general lines the well-known Martinsyde F.4, which is one of the most beautiful aeroplanes ever designed. The A.II, however, has a high coaming forming the cabin top, which is provided with windows in the sides, and has a gauze cover to combine top lighting with ventilation. The general arrangement of the machine will be gathered from the accompanying scale drawings.

the way while the passengers are getting in or out. These movable portions of the cabin roof are, as already mentioned, covered with a fine gauze, which not only helps to light the cabin, but has been found to give excellent ventilation without draught.

The pilot's cockpit is aft of the cabin, and a special wind-screen has been fitted, at the request of Mr. Cotton, we believe, so as to shelter as much as possible the pilot against the icy winds met with in Newfoundland. The controls are of the usual Martinsyde type, but the instrument board is rather more completely equipped than on standard machines. This is, of course, a result of the special work for which the machine is intended. Among the instruments is found, as indicated on one of the accompanying sketches, a Vickers-Reid



THE MARTINSYDE TYPE A, MARK II : On the left the engine housing, and on the right the cabin, pilot's cockpit, etc. The front compartment contains the wireless set. The pipe which can be seen inside this compartment is a hot air pipe from the engine housing, carrying heated air to the cabin.



The Martinsyde Type A, Mark II: Diagrammatic perspective view of the cabin, which has seating accommodation for four passengers. The deck fairing in front of the forward compartment contains the wireless outfit, and in the floor of the compartment is a mounting for an aerial camera. The hinged cabin roof is covered with gauze to ensure ventilation.

gyro turn indicator, an instrument which is rapidly becoming popular on all civil aircraft, enabling as it does the pilot to know at all times, even in the dark or in clouds, what his machine is doing.

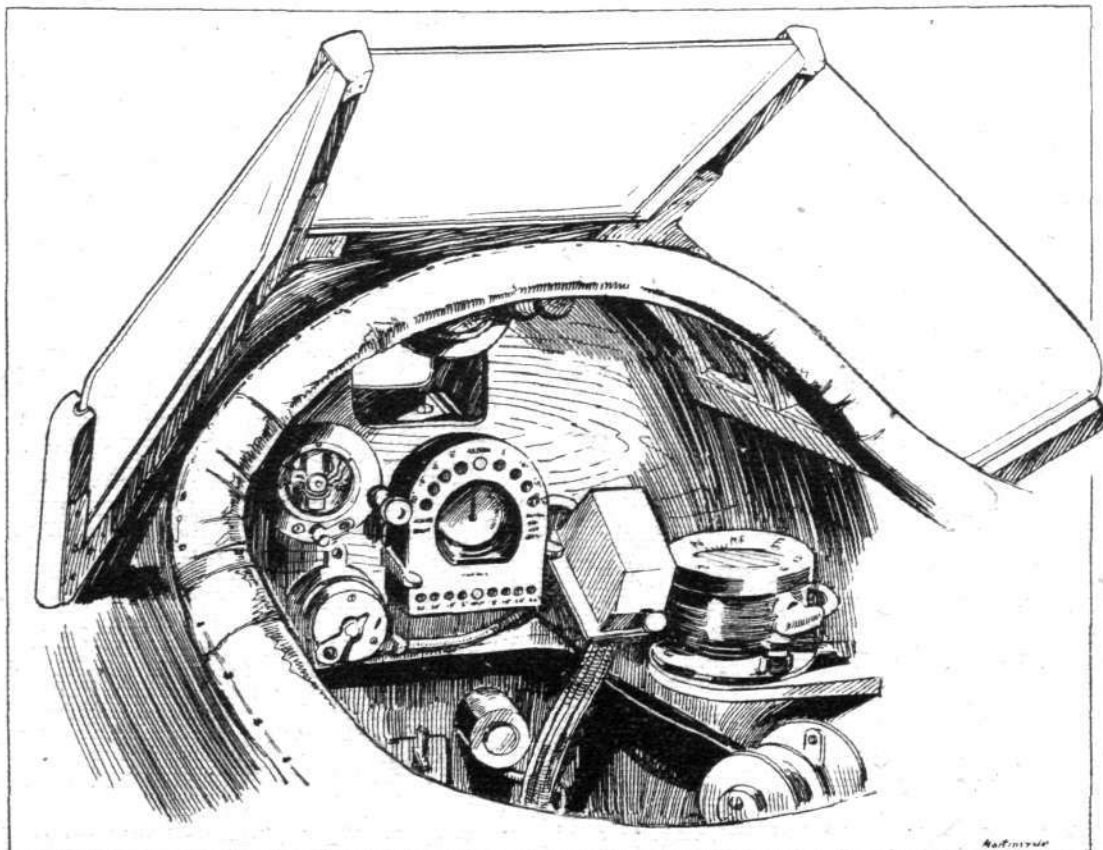
A wireless outfit is installed in the upper forward compartment, above the main petrol tank, and a hinged partition enables the operator to get at his instruments, while a removable panel in the side also gives access to the wireless compartment when the machine is on the ground. In the floor of the cabin, near the front wall, is an opening and mounting for an aerial camera, so that it will be possible for the machine to go out, locate the herds of seals, wireless the position to the base, and finally photograph the herds and bring back to the base pictures showing the exact nature of the herds and their numbers. Thus, when the sealing fleet puts to sea, it should do so with a maximum of advance

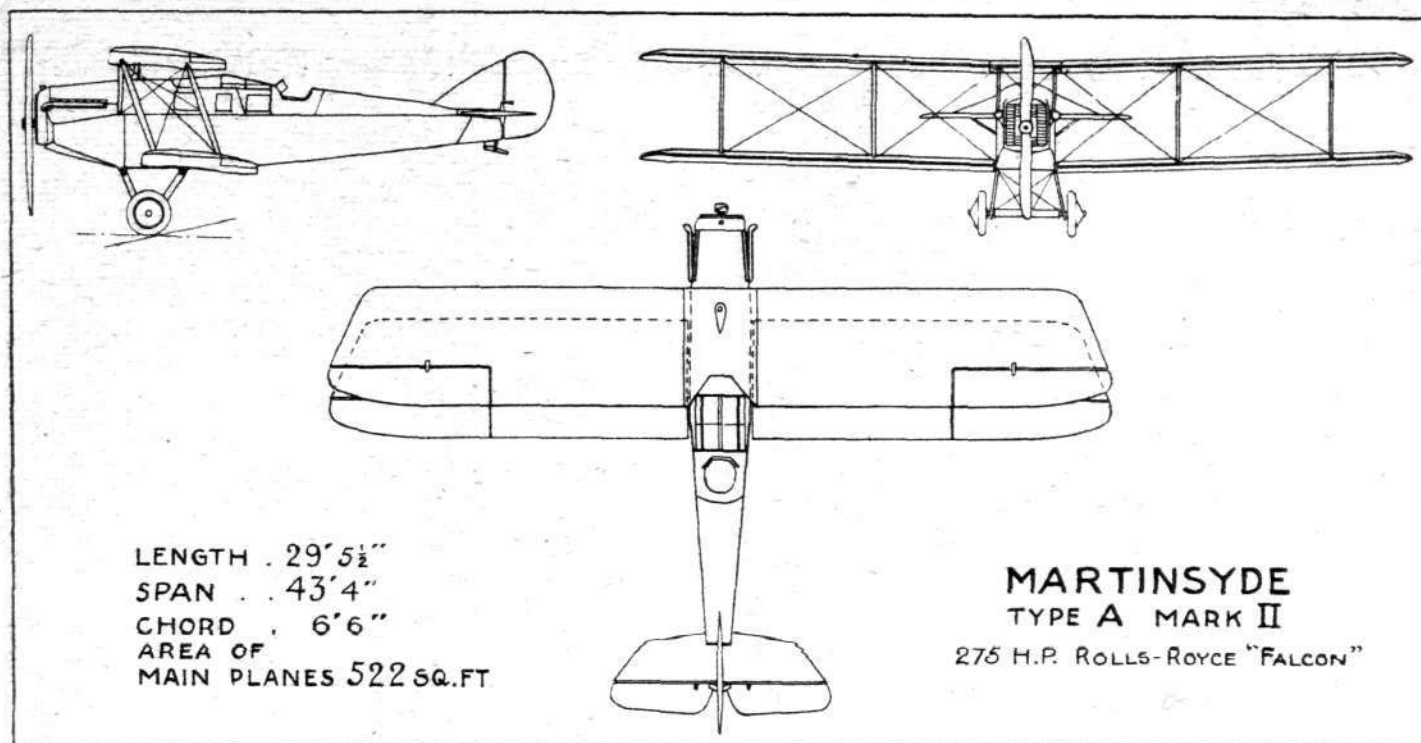
information, instead of having to waste, perhaps, many days or even weeks locating the herds.

As the machine will be used at all times of the year, the question of heating assumes some importance. In the Martinsyde A.II an attempt has been made to solve the problem by running a pipe of some 2 ins. diameter from the engine housing to the cabin. At its front end, which rests immediately behind the radiator, this pipe has a large funnel almost touching the radiator. Thus, the air which enters the pipe has already been slightly heated by passing through the radiator, while it is further heated by lying close to the exhaust pipes of the port cylinders. By means of a small lever, working in a semi-circular groove in the cabin "table" (shown in one of the sketches), the passengers are able to regulate the amount of hot air entering the cabin.

In view of the fact that the Martinsyde will be used

The Martinsyde Type A, Mark II: Sketch of the pilot's cockpit, showing instrument board. In the centre of the board may be seen the tell-tale lights of the Vickers-Reid gyro turn indicator.





THE MARTINSYDE TYPE A, MARK II: General arrangement drawings.

extensively over the sea, a pair of floats are being provided, which, by being fitted in place of the wheels, turn the machine into a seaplane. These floats are designed to be fitted with a minimum of trouble, and the change can be effected in a very short time.

The Rolls-Royce "Falcon" engine is carried on tubular engine bearers, and a fireproof bulkhead separates it from the cabin. The main petrol tank is placed in the lower portion

of the fuselage, behind the engine bulkhead, and a small gravity tank is mounted in the centre-section of the top plane. A nose radiator, provided with shutters, is fitted in front of the engine.

The machine is being crated for shipment, and within a few weeks it should be at work in Newfoundland, when, if the fates are kind, we hope to be able to record some of its doings.

THE BRITISH VICTORY AT NAPLES

Supermarine Wins the Schneider Cup Race

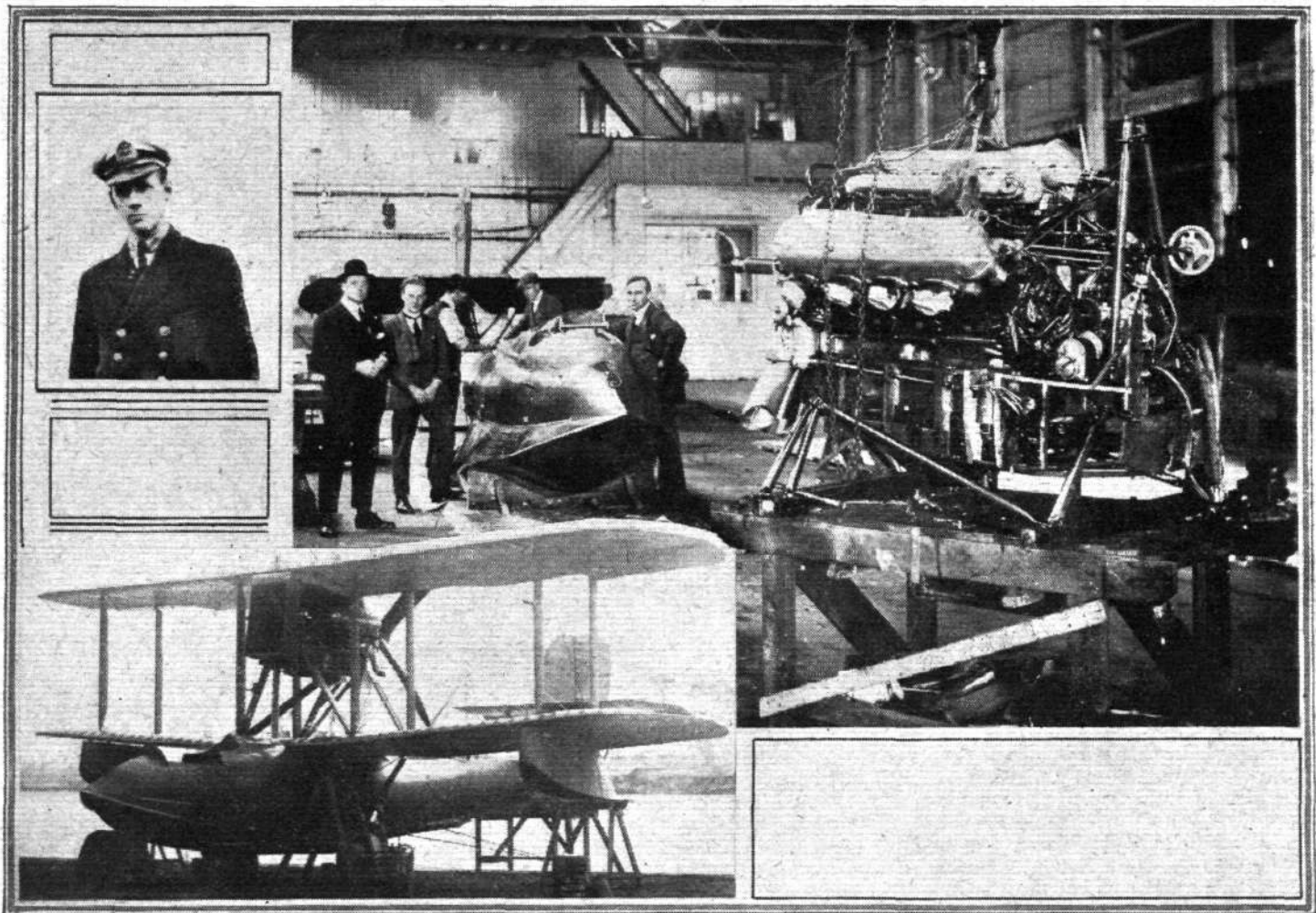
BRITISH aviation owes a great deal to the Supermarine Aviation Works and to Napier for entering a flying-boat in this year's race for the Coupe Schneider. Whether successful or not, the will to make the attempt was greatly appreciated, and the fact that this machine did win the race is all the more a matter for congratulation, as in case of the Italians winning the Cup for the third time, it would have remained in Italy as their property, and there would have been no more Schneider races. As a result of the British victory, the race will, presumably, be flown somewhere in this country next year, a fact of the utmost importance to British aviation, inasmuch as it cannot fail greatly to stimulate interest in, and development of, the seaplane type of machine. This, as we have repeatedly pointed out in this journal, is a vital necessity to the Empire, separated as its parts are by leagues of ocean, and it is to be hoped that the winning of the Schneider Cup at Naples, on August 12, may mark the turning point in British maritime aviation. The seaplane has, for some obscure reason, been very step-motherly treated, largely, no doubt, owing to a general lack of understanding of its capabilities and appreciation of the very great services which this type of machine has to offer.

Looked upon purely as a sporting effort, the winning by Capt. Biard of the Schneider race cannot fail materially to increase the prestige of British aircraft abroad. Already the very fine performances put up by Mr. James on the Mars I of the Gloucestershire Aircraft Co. have drawn the attention of the world to the quality of British land aircraft, when such quality is turned in the direction of speed, and now the establishment of a world's record for speed over a triangular course by a British seaplane has demonstrated to the world that in this branch also we are certainly not behind other nations. The quality is there, has been all along, but a lack of financial support has prevented British constructors from demonstrating, by taking part in international contests, on a large scale what we can do. The Schneider race of this year will have done much to remedy this state

of affairs, and we sincerely trust that for the future no opportunity will be lost of showing British aircraft at all important events. We fully realise that this is an expensive undertaking, but we are quite sure that in the long run the prestige thus established more than makes up for the outlay involved.

Regarding the actual race, but little information is available at present. In addition to Great Britain, France and Italy were represented. The French representatives this year did not include Sadi Lecoq, whose machine last year, it will be remembered, suffered damage to its floats, which put Sadi out of the running. The two machines that were to have represented France on Saturday last, were constructed at the *Chantiers Aero-Maritimes de la Seine*, usually abbreviated to C.A.M.S., but, unfortunately, they could not be got ready in time, and it appears that they were not finished by the time the preliminary tests of navigating on the sea, and mooring for six hours, were to be carried out. This lost them their chance of entering in the race, and the competition was reduced to a fight between the Italian representatives and the Supermarine. The two French pilots who were to have flown the "Cams" were Vroman and Teste.

It appears that in the race itself only two Italian pilots took part. Of these, Passaleva was flying a Macchi flying boat with 300 h.p. engine, and Zanetti piloted a Savoia 19 with 450 h.p. Ansaldo San Giorgio engine. The course was a triangular one, totalling 200 nautical miles, and was covered by Captain Biard on the Supermarine in 1 hour 34 minutes 51 1/2 seconds. Altogether thirteen laps of the course had to be made, so that a very great number of turns were involved, which, of course, reduced the speed of the competing machines very considerably. Over the course the speed of the Supermarine works out at approximately 127 knots, but, as a matter of fact, its actual speed in a straight line is probably not far short of 150 knots. Passaleva was second, in 1 hour 36 minutes 22 seconds, and Zanetti third in 1 hour 38 minutes 45 seconds.



THE BRITISH SEAPLANE VICTORY : Matched against the fastest seaplanes in the world, the Supermarine, with Napier Lion engine, piloted by Mr. Biard, has beaten its competitors, and won this year's Schneider race at Naples. As a result, next year's race will be flown in this country. Our photographs show the hull of the Supermarine flying boat and the Napier Lion ready for installation at the Supermarine works, Southampton, and, on the left, the complete machine on the slipways. Inset is a portrait of Mr. Biard, chief pilot of the Supermarine Aviation Works.

With regard to the machine, this was described in detail in our issue of April 20, 1922, in its original form of an amphibian flying boat, with 300 h.p. Hispano-Suiza engine. By removing the amphibian gear the weight was reduced, and the substitution of a Napier Lion did not add greatly to the total weight, while, of course, greatly increasing the speed. We believe that the wing area was also reduced so as to gain a further increase in speed, and certainly the machine must have been very fast to have beaten such formidable competitors as the Macchi and Savoia boats, which are, or were, until the arrival of the Supermarine, probably the fastest flying boats in the world.

A feature of the original Supermarine "Sea King, Mark II," was that it trimmed equally well at all flying speeds, and with engine on or off. That feature has, we believe, been retained in the racing version, the "Sea Lion," and makes the machine exceptionally nice to handle. It is a feature difficult to attain in a machine of the flying boat type, but the Supermarine designers have succeeded in doing so in spite of the difficulties. It is of interest to note that the

"Sea Lion" was doped with "Cellon," and that Smiths instruments were fitted.

A feature for which the Supermarine boats have always been noted is their exceptional seaworthiness. It will be remembered that on one occasion one of these boats was deliberately stalled from a height of about 30 feet, and yet no damage was done to the hull. The mooring tests and navigation tests of the Schneider contest did not, therefore, present difficulties, and the main problem was whether or not the machine was fast enough. This she proved to be, and Mr. Scott-Paine and Commander Bird are to be congratulated upon a very fine design, Capt. Biard on his excellent piloting, and last, but by no means least, Napier on the production of the engine which made the performance possible. The Schneider race has added yet another success to the long list already to the credit of the Napier Lion. It is now up to us to see to it that we are strongly represented for next year's Schneider Cup. One representative is certainly not sufficient, and it is to be hoped that so many machines may be forthcoming that eliminating trials will be necessary.

Anti-Aircraft Brigades

LIEUT.-COL. D. H. GILL, C.M.G., D.S.O., has been appointed Commander of the 2nd Anti-Aircraft Brigade (Territorial Army), and Col. H. S. de Brett, C.B., C.M.G., D.S.O., Commander of the 3rd Anti-Aircraft Brigade (Territorial Army). These are the two brigades which are to be formed in London.

Death of De Pischoff

It is with deep regret that we have to announce this week the death of M. Alfred de Pischoff as a result of an aeroplane accident. It appears that M. de Pischoff was flying one of his small, low-powered machines at an altitude of about 1,500 ft. when the machine suddenly dipped violently and M. de Pischoff was thrown out.

An Austrian by birth, Alfred de Pischoff had worked all

his life in France, and he was among the early aviation pioneers of flying, having as collaborator M. Archdeacon. In 1910 he built a small monoplane with E.N.V. engine, which was remarkable for its originality. The fuselage was very similar to the body of a motor-car, and the engine, placed in front, behind a nose radiator, drove a pusher screw, *via* a chain. A clutch was incorporated, and the engine was started with an ordinary starting handle; having got his engine going, the pilot got into his seat, let in his clutch, and away he went.

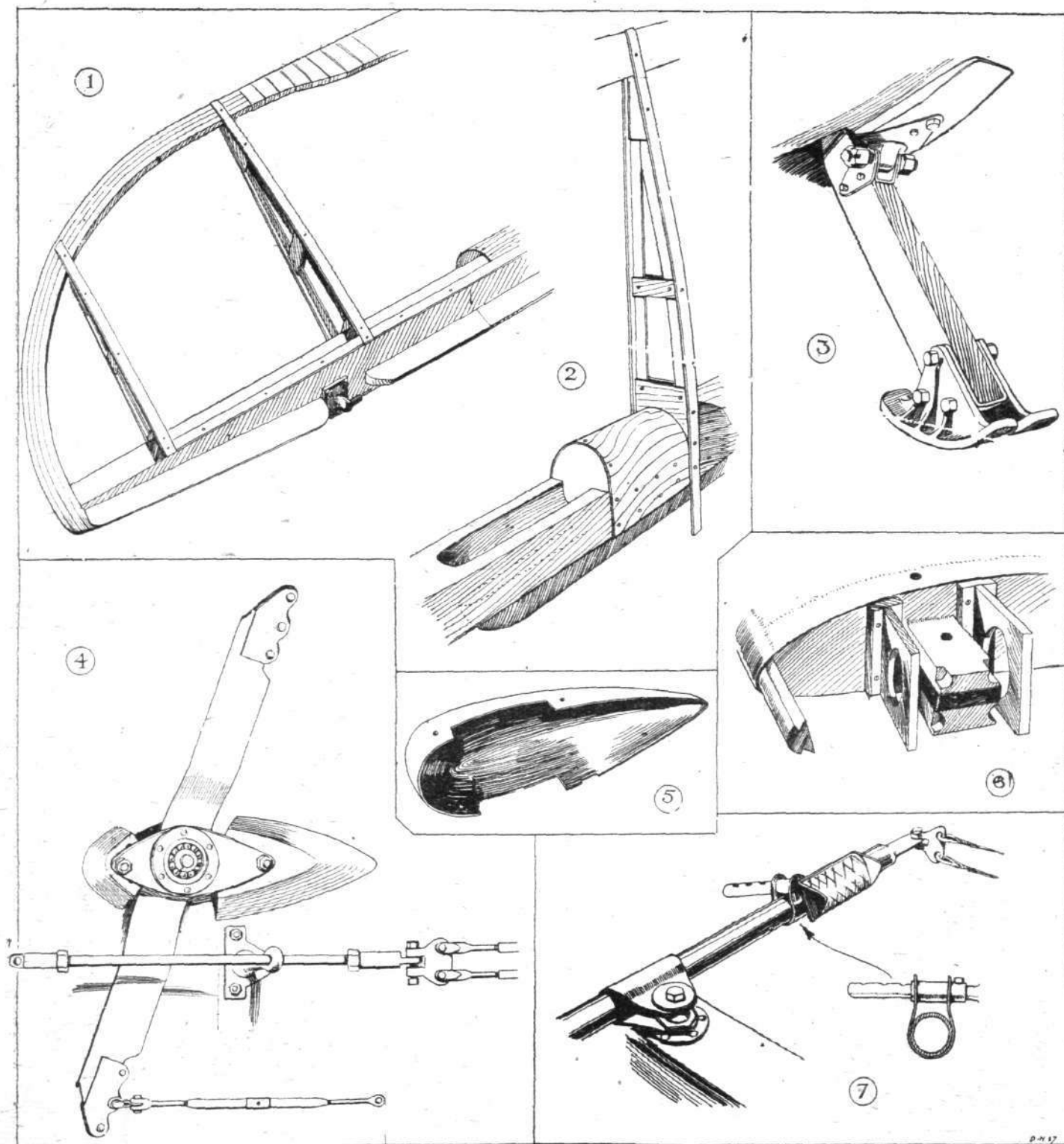
Early in the War de Pischoff went to Russia, where he joined the Army. When the revolution came he returned to France. Since the War he had been working on the production of small, low-powered sporting aeroplanes, and a couple of years ago he produced a small biplane, which flew very well with a two-cylinder Clerget engine of 16 h.p.

THE DE HAVILLAND 37

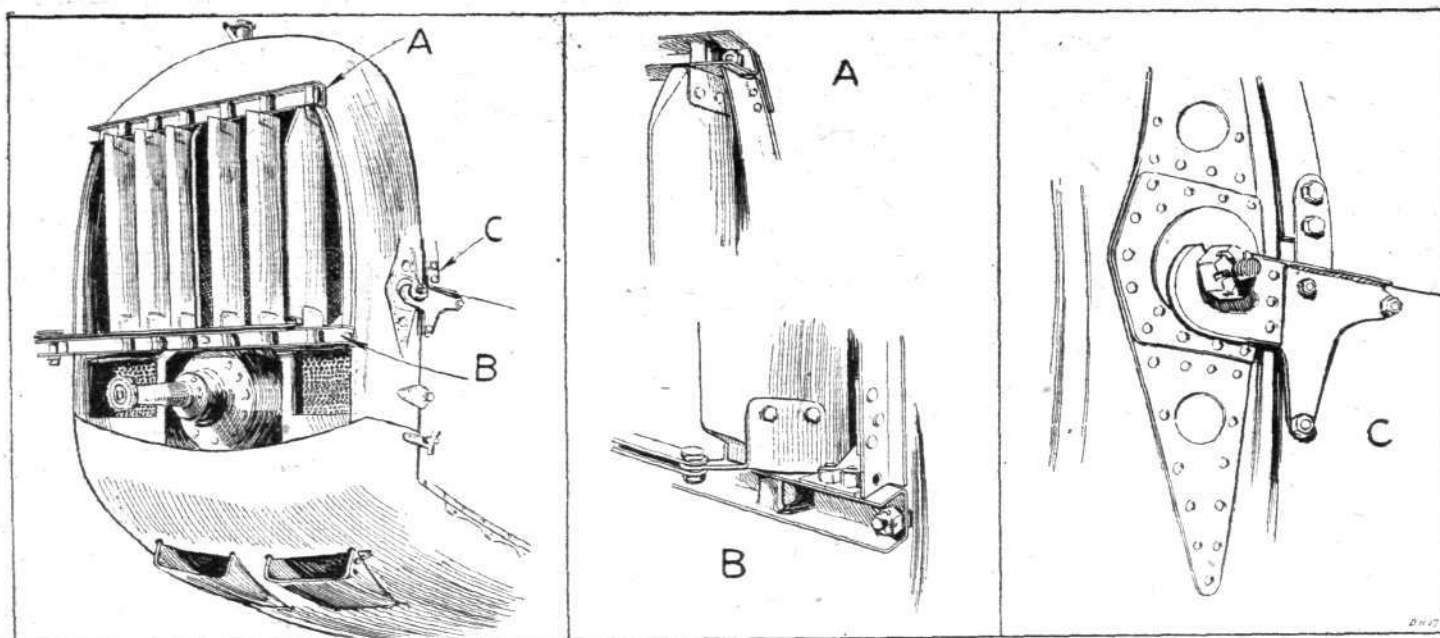
OWING to extreme pressure on our columns in last week's issue of *FLIGHT*, caused by the very full illustrated account of the Aerial Derby and Waddon Meeting, two sets of sketches illustrating constructional details of the interesting De Havilland 37 were, unfortunately, crowded out of the description of this machine. Several photographs, scale drawings and a control diagram were published, and these we supplement this week by printing below a number of sketches illustrating some of the more interesting features of the machine. It was most unfortunate that engine trouble developing just at the moment of the start should have prevented Mr. Butler from taking part in the race. He very sportingly made a start

about a quarter of an hour after his official starting time, and completed one lap of the course, but, after the long delay, he would have stood no chance whatever in the handicap. It should also be pointed out that the time made by Mr. Butler in the lap which he completed does not by any means represent the actual speed of the machine. With the engine far from being up to concert pitch, and various little adjustments still having to be made before the machine is considered thoroughly tuned up, the speed over the Derby course must have been close on 20 m.p.h. below that of which the machine will ultimately be capable.

With regard to the constructional details, these will in



THE D.H. 37 : Some constructional details. 1, General construction of an aileron. Note the laminated corner. 2, Detail of aileron, showing how spar is stiffened against torsion by horizontal U of thin three-ply. 3, The very substantial tail skid, for which large bearing area is provided. Note detachable metal shoe. 4, Elevator crank lever with its ball bearing. The horizontal rod below is incorporated in the rudder control cable. 5, is the aluminium streamline casing which covers the elevator ball bearing. 6, Details of the lower plane spar root which is carried in a fitting on the side of the fuselage. 7, Details of the adjustable pedal on the foot bar.



THE DE HAVILLAND 37: Some radiator details. A and B, details of the shutter. C, the trunnion mounting which supports the radiator.

most instances be clear from the accompanying sketches. The majority of the features illustrated were referred to in the description published last week (pp. 452-455), and to

that we would refer readers desiring further information than that which can be gained from an inspection of the accompanying drawings.

IN PARLIAMENT

Imperial Air Defence Decisions

VISCOUNT CURZON on Aug. 3 asked the Prime Minister whether the Government have yet been able to consider the question of the control and provision for the air arm of the Royal Navy; whether the Government are satisfied that adequate provision is being made to meet the Admiralty requirements for fighting, reconnaissance, and spotting 'planes; and whether better provision in these respects and actual economies can be made if a reorganisation of the branch of the Royal Air Force operating with the Royal Navy is carried out and the Royal Navy made responsible for and be given control of its air arm?

Sir Harry Brittain asked whether the Imperial Defence Committee has reached any decision which will enable production orders to be given forthwith to the recognised British aircraft and aero-engine firms, so that they may find it possible to keep their works going and their experienced staffs together until the House reassembles in November?

Capt. W. Benn asked whether the Imperial Defence Committee has decided that the Navy will be permitted to supply and control aircraft of its own?

The Prime Minister: The Government, as the result of an enquiry by the Committee of Imperial Defence, have decided to adopt a scheme submitted by the Air Ministry providing a force of 500 machines for home defence at an increased cost of £2,000,000 per annum. £900,000 out of the total of £2,000,000 will be found by economies in the Estimates of the Air Ministry.

The enquiries of the Cabinet Committee on Economy in the Fighting Services have advanced sufficiently far to enable me to state that the addition to the Air Estimates will not prevent a reduction in the total estimates of the three fighting services for the year 1923-24.

Considerable orders in execution of this programme will be placed with private firms in the current calendar year.

The foregoing decisions will not prejudice a further expansion of the Royal Air Force if later on this is found necessary to our national security. This question will be considered in the light of the financial situation next year and of the air policy adopted by other Powers.

The enquiry into the system of naval and air co-operation, and as to the best method of securing that the Air Force should render to the Navy the aid it may require, has not yet been completed.

Lieut.-Col. Fremantle: Will the right hon. gentleman reply to Sir Harry Brittain's question, and as regards the subsidiary services?

The Prime Minister: That is a matter regarding which the enquiry is still proceeding.

Lieut.-Col. Fremantle: Will the reports be published?

Col. Wedgwood: Is the enormous increase in the expenditure on the Air Force due to the enormous development of the Air Service in France?

The Prime Minister: Well, we have to take all the circumstances into account.

Sir W. Joynson-Hicks: Is the answer of the right hon. gentleman in lieu of the proposed statement that we understood the Prime Minister would make tomorrow; will he make no further statement?

The Prime Minister: No.

Sir W. Joynson-Hicks: Then the matter cannot be debated?

The Prime Minister: That is a matter for Mr. Speaker, and not for me, but I should have thought it could have been discussed on the Adjournment Motion.

Gratuity

MR. RAPER asked the Secretary of State for Air why it has been decided to treat service as a technical officer of the Air Board as service in civilian employment for the computation of gratuity in the case of officers of the Royal Naval Air Service and of the Royal Naval Volunteer Reserve who were ordered to such service, not only without notice that their status as naval officers was in any way affected, but, in some cases, with a definite assurance from the Admiralty that that status was maintained?

Capt. Guest: The decision to exclude the service in question from the computation of gratuity was in accordance with the Admiralty Order which governed these officers' gratuities, the principle being that service on other than naval rates of pay was not gratuity-bearing.

Flying Boats

VISCOUNT CURZON asked the Parliamentary Secretary to the Admiralty whether the flying warship now under construction on Southampton Water is being constructed according to Admiralty requirements and specifications; and, if not, are the Admiralty in complete touch with all details as to its construction and fittings?

Capt. Guest: I have been asked to reply. By the term flying warship, I assume that my noble and gallant friend has in mind the flying boat referred to in his question of July 27, in answer to which I informed him that it was only a flying boat hull that was under construction. The construction of this hull is simply one stage in the gradual development of the policy which has been frequently thought out and discussed with the Admiralty of producing flying boats which can carry out a prolonged cruise. It is the duty of the Air Ministry to arrange for the construction of such experimental boats as are necessary for this development, and it is for this purpose that the hull referred to has been produced. There is no lack of co-operation with the Admiralty in the matter.

Naval Wing (Officers)

VISCOUNT CURZON asked the Parliamentary Secretary to the Admiralty whether, when the Admiralty asked for volunteers to be seconded to the Royal Air Force, they were to be paid the pay of the Royal Air Force, to be allowed to wear their naval uniform, and to hold the same relative rank; if not, on what grounds; whether any naval officers now are attached, lent, or seconded to the Royal Air Force; whether they are paid at Royal Air Force rates of pay, hold their relative rank, and wear their uniform; and whether they volunteered for service with the Royal Air Force?

Mr. Amery: I assume that my noble and gallant friend refers to the scheme of attachment to the Royal Air Force promulgated in Admiralty Fleet Order 2011 (a) of 1920, and not to the short courses of training as observers which are now in operation. Under the former scheme, officers were graded as flying officers on joining, but if they held rank in the Royal Navy higher than sub-lieutenant, they were granted honorary rank in the Royal Air Force equivalent to their naval rank. During their service in the Royal Air Force, however, they carry the rank, pay, and authority of their substantive Air Force grading for all Air Force purposes. They are eligible for substantive promotion to flight-lieutenant, by selection in vacancies, after qualifying as pilots. The uniform worn is, in the case of Service uniform, that of their substantive Royal Air Force rank, or of the honorary rank if held, and, in the case of full dress and mess-dress, naval uniform. I may add that these conditions were those considered necessary by the Air Ministry, who attached considerable importance to the officers wearing the Service dress of the Royal Air Force, even if they wore the mess-dress and full dress of their parent Service. Seven officers, who volunteered for service with the Royal Air Force under this scheme, were attached in September, 1920, for a period of three years. As I explained in my reply of July 25 to the hon. and gallant member for Maidstone (Commander Bellairs), proposals were discussed for attaching a further number of officers in 1921, but the scheme fell through on account of the revised conditions, which the Admiralty thought were necessary to make any voluntary scheme a success, not being acceptable to the Air Ministry. No other officers are now attached, lent, or seconded, as, although officers undergoing courses as observers carry out the greater part of their training with the Royal Air Force, they remain under naval conditions throughout.

Air Defence

MR. L'ESTRANGE MALONE, on August 3, asked the Prime Minister if he can make a statement in regard to the decision of the Cabinet on the position of the Royal Air Force and the question of granting further support for civil aviation; and whether His Majesty's Government still intend to proceed with the construction of the two new battleships, seeing that this money can more profitably be expended, partly on air development and partly on social services?

Mr. Chamberlain (Leader of the House): I would refer the hon. member to the statement made by my right hon. friend on this subject yesterday.

Mr. Malone: In regard to the second part of the question concerning the two new battleships, the right hon. gentleman has not dealt with that?

Mr. Chamberlain: It is proposed to proceed with the two new battleships.

IMPERIAL AIR MAIL SERVICES

First Report of Civil Aviation Advisory Board

At the Air Conference, held last spring, Capt. Guest announced the appointment of a Civil Aviation Advisory Board, "to advise generally on the development of Civil Aviation, and to report upon any specific point which may from time to time be referred to the Board by the Secretary of State for Air," and stated that the first subject upon which the Board had been asked to give its recommendations was the question of the cost and practicability of an Imperial Air Mail Service. The C.A.A.B. has now issued its first report, which takes the form of a White Paper (Command No. 1739, price 1s. net), published by H.M. Stationery Office. The report is divided into two parts, of which the first deals with general considerations, while the second refers in detail to an air mail service to India. Estimates of costs, revenue, etc., are contained in nine appendices giving the detailed estimates upon which the figures of totals in the body of the report were based.

General

The report states that when the Board started their deliberations it was understood that an airship scheme had been submitted by Commander Burney, and that accordingly they confined their attention to the operation of an air mail service by heavier-than-air craft. The Board state that they have been impressed with the complexity of the problems, and also that they are unanimously convinced that considerations of a national and Imperial character must outweigh in importance any purely commercial considerations. Whatever the military air reserve may be, the Board hold that the machines, pilots and personnel generally employed on Imperial air mail services will form an additional reserve from which assistance could be drawn in case of war, while the production of passenger and goods aircraft, in addition to service aircraft, will keep factories and designing staffs employed and capable of more rapid expansion in case of need. The progress and development in civil aviation that has taken place abroad have not been overlooked by the Board, and the report states that the Board are of the opinion that "if civil undertakings are making an efficient attempt to keep open the civil airways of the Empire by means of rapid and direct air communications, they can fairly claim a considerable measure of financial assistance from the Government until they have been able to establish themselves on a sound financial basis."

It is pointed out that the estimates given in the report are based on information gained with existing types of machines, and that they should not be taken as referring to equipment specially constructed to meet local conditions. The Board think that the most suitable type of machine may vary along the route, and that while certain sections may be operated with land 'planes, other portions may more economically and safely be equipped with seaplanes, flying boats or amphibians. In order to discover the most suitable types of machines and engines, the Board recommend that the technical and scientific aspects of the problems should be referred to the Aeronautical Research Committee, with the suggestion that they should be submitted to a sub-committee and that special funds should be allocated for the purpose. The terms of reference of the Aeronautical Research Committee which the Board suggest are as follows:—

"To consider the scientific and technical aspects of Civil Aviation problems connected with the establishment of an Imperial Air Mail Service, and to decide upon and supervise the conduct of such experimental work and construction (including both model and full scale) as in their opinion is required for the purpose, with particular attention to such matters as—

"(1) The dimensions, speed, power and material of the aeroplanes to be employed, having regard to the useful load to be carried and to the most economical length of stage.

"(2) The other desirable characteristics of the machine, e.g., the relation between its maximum and minimum speeds, safety in alighting, stability and controllability at all speeds, freedom from undue vibration and noise.

"(3) The most economical length of stage, especially in its relation to (a) the pilot's power of endurance; (b) the characteristics of the machine; (c) the nature of the ground traversed.

"(4) The engine and its mounting on the machine: questions of power, weight, fuel and oil consumption, size of machine, length of stage and useful load.

"(5) Questions of safety, strength and load factor; risk of fire.

"(6) Questions relating to navigation and meteorology; the most desirable instruments for the machine; the height

at which to fly and the general characteristics of air flow as affecting civil air transport;

"And generally such other scientific and technical matters as may arise."

The report states that the Board have studied with attention the report presented by Lord Weir's Committee of 1919, and endorse the opinion therein expressed that the organisation of a commercial air mail service by private enterprise, supported and encouraged by financial and other assistance from the State, is, in accordance with British traditions, the most natural and suitable form of organisation. It is, the report points out, in selecting the actual form of Government assistance that difficulties are met, and some of these are set forth in the report. Thus it is clear that the capital outlay will be large, and that if the Government were to guarantee an interest of 5 or 6 per cent., much of the incentive to economical and efficient operation would be removed. On the other hand, it is realised that investors will not be forthcoming if the probabilities of eventually earning a larger rate of interest are too speculative, and any form of assistance is too indefinite unless it secures a certain income in return for a regular service. In the opinion of the Board any system of State subsidy should comply with the four following conditions:—

"(1) It should assure a return on the capital invested by the operating company. (2) It should give the operating company a sufficient inducement to effect economies in management and operating charges. (3) There should be a definite maximum limit to the liability assumed by the State. (4) In case of imperial emergency the Government should have the call upon all the aircraft, equipment, pilots and personnel of the operating company."

It is pointed out that there are obviously a number of alternative methods which would ensure this result, and one such method is outlined in an appendix, from which we quote:—

"I. The Government to guarantee (a) a low rate of interest on the capital invested; and (b) the amount of the working expenses, agreed between the Government and the contractors.

"II. The contractors to retain (a) the whole of the earnings of the service; and (b) a percentage of any reduction effected in the agreed sum for working expenses.

"III. Any balance left after the payment of a dividend at an agreed rate per cent. on the capital to be divided equally between the Government and the contractors.

The Board consider that the magnitude of the undertaking makes it evident that the enterprise can only be entrusted to a company, created, if necessary, for the purpose, of outstanding Imperial distinction as regards its directorate. It is contemplated that the actual route to be followed would be selected after discussion and agreement with the R.A.F., and that the aerodromes, if not already in the possession of the State, would be acquired by the State, the plant and shed accommodation, etc., being rented to the operating company. The company, however, should be responsible for the management of the aerodromes, the Government to have the right to take over the aerodromes and ground organisation in case of Imperial necessity.

With a view to securing the best offers the Board recommend that, when the route has been selected, an open tender should be advertised asking for terms and conditions on which tenderers would be prepared to maintain a service for the carriage of mails daily, bi-weekly and weekly, as might be decided upon, assuming a load of 500, 1,000 or 2,000 lbs. of mails per week. In this way it is considered that a wider range of alternative methods would be forthcoming than if such tenders were confined to offers in accordance with terms dictated beforehand.

Air Mail Service to India

Having made these observations on the general problems, the Board turn their attention, in Part II, to the question of an air mail service to India. It is stated that the Board started their deliberations by collecting information concerning the fortnightly service which has been in operation by the R.A.F. for a little over a year between Cairo and Baghdad, and it is pointed out that by the use of this service the time for mails is reduced from 27-30 days to about eight days, and that for this remarkable advantage a surcharge of only 6d. per ounce is charged. About 10 per cent., it is stated, of the total mail is now air borne over this route.

There are, the report states, three main routes that might be followed for the carriage of mails by air to India, i.e., via Egypt, via Constantinople, and via Alexandretta. The route

via Egypt would make use of the existing R.A.F. route from Cairo to Baghdad, and is therefore capable of more immediate operation by a commercial undertaking. This route is as follows:—Cairo, Ramleh, Amman, Ramadi, Baghdad—a total distance of 833 miles.

The route via Constantinople gives the most rapid line, the report states, but it is pointed out that, apart from physical difficulties, in the present unsettled state of portions of Turkey in Asia it must be some time before such a route can be regarded as a practical proposition. An outline of such a route is given in the report, with the reservation that it should be understood that whether or not this route is practicable still has to be determined. The route outlined is as follows:—Constantinople, Eskisher, Konia, Adana, Aintab, Urfa, Mardin, Mosul, Tekrit, Samara, Baghdad, a total distance of 1,145 miles.

The third route, via Alexandretta, will come into prominence if the French proposed service from Paris via Italy and Greece to Alexandretta matures. The British route from there would link up with the route outlined above either at Adana or at Aintab.

Whichever route is chosen, the Baghdad-Karachi section is a necessary link in the chain, but the report points out that the actual route to be followed and the types of aircraft to be employed involve special considerations. On the one hand, the Persian postal authorities have obtained permission to use the R.A.F. service from Cairo to Baghdad, and the Persian Government has formally adhered to the International Convention for Air Navigation, so that no difficulty will arise in connection with the operation of civil aircraft registered in Great Britain, India, or any of the Dominions. On the other hand, the R.A.F. are interested in the maintenance of a strategic route to India, which, it is thought, this route on the northern, or Persian, coast of the Gulf might not provide. It is understood that consideration is being given to a possible alternative route along the Arabian shore of the Persian Gulf, but it is stated that this route is unlikely to be opened for service purposes in the near future. The route down the Persian side of the Gulf would probably be: Baghdad, Basra, Bushire, Bundar Abbas, Chahbar, Karachi, a total distance of 1,650 miles.

Karachi-Bombay.—The Board record their conviction that, although this first report deals only with the section of an Imperial Air Mail service to India, Karachi can never be the real main terminus for India, but that the main Imperial Air Route should extend from Karachi to Calcutta and beyond. They also state that they have been assured by the General Post Office that, unless the air route is extended beyond Karachi, one day of the gain would be lost on approximately 70 per cent. of the total mail to India. The Board have therefore assumed provisionally that a feeder line must be established from Karachi to Bombay. This route, which would be operated by flying boats or seaplanes, would probably be as follows: Karachi, Bajkote, Bombay—a total distance of 550 miles.

London-Constantinople or London-Alexandria?—The report calls attention to the fact that an "all-red" air route cannot yet be mapped out from England to India; but, it is stated, it is anticipated that soon this will be nearly, if not entirely, achieved by the production of a machine which can make the trip from London to Malta, via Paris and Marseilles, a distance of 1,330 miles, in one flight. In the meantime there are several routes through Europe that could be organised. For instance, it is pointed out that British machines could carry mails from London to Constantinople or Cairo, or mails could be carried by British machines to Paris, and thence by the Compagnie Franco-Roumaine on French machines to Constantinople, if the times of arrival and departure were satisfactorily arranged. Three possible routes have been considered:—(a) For operation by landplanes over the London-Constantinople route; (b) landplanes from London to Brindisi and seaplanes from Brindisi to Alexandria by seaplanes or flying boats; and (c) a seaplane route from Southampton via Cherbourg, Bordeaux, across the south-west of France, Sardinia, Malta and Crete to Alexandria. The last-mentioned route measures about 2,650 miles, and is considered too long for practical comparison with the other routes suggested.

Route (a)—overland to Constantinople—would be as follows:—Brussels 200 miles, Frankfurt 200 miles, Nuremberg 110 miles, Vienna 270 miles, Budapest 150 miles, Bucharest 390 miles, Constantinople 280 miles; total, 1,600 miles. Route (b) is divided into two sections, the first of which to be covered by aeroplanes, the second by seaplanes or flying boats. For the first section the stages are as follows: Paris 200 miles, Lyons 245 miles, Marseilles 170 miles, St. Raphael 70 miles, Pisa 185 miles, Naples 285 miles and

Brindisi 200 miles—a total of 1,355 miles. The second section, over the sea, would be: Brindisi to Patras Harbour, Greece, 270 miles, Suda Bay, Crete, 260, and Alexandria 480 miles—a total of 1,010 miles, and a total distance from London to Alexandria of 2,365 miles.

Frequency of Service.—The Board, it is stated, started by enquiring into the cost of a bi-weekly service between Baghdad and Karachi, on the assumption that machines would be flown in pairs. Owing to the estimate of maximum load of mails made by the G.P.O., this was reduced to a weekly service in the initial stages, and finally the practicability of operating the route with machines flying singly, assuming certain improvements in the wireless organisation, was considered. The Board desire to call attention to the fact that the expense of the ground organisation is in some degree independent of the frequency of the service and of the number of machines actually flying, and that consequently the cost per trip decreases rapidly with an increase in the frequency of the service. It is therefore hoped that, although it may be necessary to start with a weekly service, it will be found possible at an early date to increase the frequency and thus reduce the cost per trip.

Time Saved by Air Mail

Although expressing the opinion that the saving in time by using the air mail is by no means the only, nor indeed the most significant, reason for establishing such a route, the Board make some estimates of the time which could be expected to be saved if the establishment of an air mail service from either Constantinople or Port Said to Baghdad, Karachi and Bombay were undertaken. At present the time taken by train and steamer from London to Port Said is given as 5½ days, and from London to Constantinople as 4½ days. If air services were established onward from either of these places, the time taken (assuming a weekly service flying by day only) would be: To Baghdad, 7 days instead of 27 to 30 days; to Karachi, 9 days instead of 16½ days; to Bombay, 10 days instead of 14½ days. When regular night flying has made a continuous service practicable, the time taken in air transit will, it is stated, be more than halved.

If the mails were carried by air from London to Constantinople or Egypt, the saving in time with a weekly service would, it is estimated, be further increased, and would be as follows:—

	Rail and Steamer.	Aircraft flying by day (100 m.p.h.).	Saving.
	Days.	Days.	Days.
London to Constantinople	4½	2	2½
Port Said	5½	3	2½
Baghdad	27-30	5	22-25
Karachi	16½	7	9½
Bombay	14½	8	6½
(Calcutta	16½	9	7½

Estimates of Cost.—In the estimates of costs published in the report the Board have used as a basis existing machines, and have consulted constructors and also companies operating on the London-Paris service. In the estimates relating to land routes, aeroplanes of the following characteristics have been assumed: Engine, 400/450 h.p.; petrol capacity, 3½ hrs.; load, 2,000 lbs., exclusive of pilot. Cruising speed at 5,000 ft., 100 m.p.h. Estimates contained in appendices to the report deal with weekly and daily services, those for the Cairo-Karachi and Constantinople-Karachi sections being summarised in the following table, in which the first column gives the stages, the second column the cost (sterling) per trip, and the third column the cost per machine mile (sterling):—

Weekly Service.		£	s.	d.
Cairo-Baghdad	675	15	0	
Baghdad-Karachi	981	11	11	
(1) Cairo-Karachi	1,656	13	0	
Constantinople-Baghdad	946	15	9	
Baghdad-Karachi	981	11	11	
(2) Constantinople-Karachi	1,927	13	6	
Daily Service.		£	s.	d.
Cairo-Baghdad	230	5	1	
Baghdad-Karachi	395	4	9	
(3) Cairo-Karachi	625	4	10	
Constantinople-Baghdad	365	6	1	
Baghdad-Karachi	395	4	9	
Constantinople-Karachi	760	5	3	

The Board have further considered that the section of the route from Baghdad, or rather from Basra, to Karachi might

advantageously be operated by some type of marine aircraft or amphibians, and estimates have been prepared for a weekly and also for a daily service from Cairo to Basra with aeroplanes, and from Basra to Karachi with flying boats. The land machines considered are of the same type as that for the previous section, but the type of flying boat upon which the estimates were based has the following specification: Two 350/365 h.p. engines; cruising speed at 2,000 ft., 80 m.p.h.; petrol capacity, 500 miles; load, 2,000 lbs., exclusive of pilot. In tabular form, the columns having the same significance as before, this section of the service may be summarised as follows:—

Weekly Service.		£	s.	d.
Cairo-Basra	790	13	9	
Basra-Karachi	1,294	19	1	
Cairo-Karachi	2,084	16	8	
Daily Service.		£	s.	d.
Cairo-Basra	318	5	6	
Basra-Karachi	591	8	9	
Cairo-Karachi	909	7	4	

With regard to the feeder line from Karachi to Bombay the Board are in agreement that this section should be operated by other than landplanes, and amphibians of the following specification have been used as a basis for the estimates: Amphibian flying boat, 400/450 h.p. engine; load, 1,500 lbs., exclusive of pilot; petrol capacity, 3½ hrs.; cruising speed at 2,000 ft., 80 m.p.h. A weekly service is then estimated to cost £539 per trip for a weekly service, and £225 per trip for a daily service. The figures for machine miles are 17s. 11d. and 7s. 6d. respectively.

Estimates are also given for the London-Constantinople (landplanes) and London-Brindisi (landplanes) and Brindisi-Alexandria (flying boats) routes. The summarised figures of costs work out as follows:—

Weekly Service.		£	s.	d.
(1) London-Constantinople ..	650	8	1	
(2) London-Brindisi-Alexandria	1,319	11	2	
Daily Service.		£	s.	d.
(3) London-Constantinople ..	286	3	7	
(4) London-Brindisi-Alexandria	574	4	10	

It is pointed out in the report that these estimates differ from those prepared for routes in Asia, as aerodromes in most cases already exist. With regard to the available load on these European routes the report states that "it must be remembered that each of the countries would have the right to refuse permission to a British company to pick up and carry local traffic from one place to another within its own boundaries, and would probably exercise this right." The Board state as their opinion that the trans-European route, which could with existing machines be flown in little more than 16 daylight hours of actual flying time, will eventually prove to be the quickest route for the transport of mails from London to India and the Empire. For purposes of comparison the following table of costs for the operation of air services throughout from London to Karachi is of interest:—

COST.

—	Capital.	Per Annum.	Per Trip.	Per Flying Hour.	Per Mach. Mile.
Weekly Service.					
(One machine in each direction once a week):—					
(i)					
London-Constantinople (landplane).	55,000	67,573	650	40 12 2	8 1
Constantinople-Baghdad (landplane).	190,000	98,440	946	78 17 7	15 9
Baghdad-Karachi (landplane).	190,000	102,036	981	59 9 3	11 11
Totals	435,000	268,049	2,577	—	—

—	Capital.	Per Annum.	Per Trip.	Per Flying Hour.	Per Mach. Mile.
Weekly Service continued:—					
(ii)					
London-Brindisi (landplane).	155,500	137,245	1,319	50 15 2	11 2
Brindisi-Alexandria (flying boat).	98,000	70,265	675	75 1 4	15 0
Alexandria-Baghdad (landplane).	190,000	102,036	981	59 9 3	11 11
Totals	443,500	309,546	2,975	—	—
(iii)					
London-Brindisi (landplane).	155,500	137,245	1,319	50 15 2	11 2
Brindisi-Alexandria (flying boat).	109,000	82,142	790	68 13 7	13 9
Alexandria-Basra (landplane).	225,000	134,592	1,294	76 2 7	19 1
Basra-Karachi (flying boat).	489,500	353,979	3,403	—	—
Totals	905,500	764,187	1,046	—	—
Daily Service					
(One machine in each direction daily):—					
(i)					
London-Constantinople (landplane).	165,500	209,093	286	17 18 8	3 7
Constantinople-Baghdad (landplane).	370,000	266,810	365	30 9 2	6 1
Baghdad-Karachi (landplane).	370,000	288,284	395	23 18 10	4 9
Totals	905,500	764,187	1,046	—	—
(ii)					
London-Brindisi (landplane).	388,000	419,069	574	22 1 7	4 10
Brindisi-Alexandria (flying boat).	197,000	168,205	230	25 12 0	5 1
Alexandria-Baghdad (landplane).	370,000	288,284	395	23 18 10	4 9
Baghdad-Karachi (landplane).	955,000	875,558	1,199	—	—
Totals	955,000	875,558	1,199	—	—
(iii)					
London-Brindisi (landplane).	388,000	419,069	574	22 1 7	4 10
Brindisi-Alexandria (flying boat).	263,500	232,139	318	27 13 1	5 6
Alexandria-Basra (landplane).	475,000	431,705	591	34 15 9	8 9
Basra-Karachi (flying boat).	1,126,500	1,082,913	1,483	—	—
Totals	1,126,500	1,082,913	1,483	—	—

Estimates of Receipts

The report points out the difficulties of estimating receipts, and states that the Board have felt it to be unwise to proceed upon any basis except one of extremely conservative estimates, and the assumption has been made that an operating company could only look for an average maximum in each direction of 500 lbs. of mail per weekly trip. This is equivalent to 5 per cent. of the total mail, or in other words, at 25 letters to the pound, 12,500 letters per weekly trip. It is also expected that an average of four passengers each way per weekly trip could be counted upon at a fare of £50. The Post Office assumption of a maximum load of 500 lbs. a trip is based upon a regular service, and on an air fee of 1s. per ounce letter, and the Board think that, although the distance is shorter, the saving in time is greater to Baghdad, and suggest that the same letter surcharge of 1s. should be obtained for air-borne letters from Cairo or Constantinople to Baghdad as for those carried to Bombay. On this assumption of 500 lbs. of mail at 1s. per ounce letter and four passengers at £50 each, the receipts per weekly trip from Cairo or Constantinople to Bombay would be £825, and it is also estimated that

the expenses per trip would be covered if the mails per trip at 1s. per ounce letter were increased to 1,757 lbs. in the case of the Cairo-Bombay route, and to 1,973 lbs. for the Constantinople-Bombay route. This assumes that no passengers were carried.

Recommendations

In conclusion the Board make the following recommendations:—

A.

(1) A technical and scientific investigation should be instituted to ascertain the most suitable type or types of aircraft and engines for a service to India, and the most economic length of the stages.

(2) A specially appointed Sub-Committee of the Aeronautical Research Committee should be made responsible for this enquiry with the terms of reference set forth in paragraph 12 of this report.

(3) A total sum of £200,000 spread over three years should be set aside for this purpose and for the purchase of experimental matériel.

(4) This investigation should not in any way interfere with the establishment and operation of an air mail service to India.

B.

(1) (a) The route from Baghdad to Karachi should be laid out and prepared for operation by civil machines, the necessary plant should be erected and the construction of the shed accommodation proceeded with. For this purpose we estimate that a total sum of £100,000 would be necessary, spread over three years. (b) Tenders should be invited for both a weekly and a daily service from Baghdad to Karachi and Calcutta with a branch line to Bombay.

(2) (a) The route from Cairo to Baghdad now operated by the Royal Air Force should be prepared for operation by civil machines. For this purpose we estimate that a total sum of £20,000 would be necessary. (b) Tenders should be invited for both a weekly and a daily service from Cairo (or Port Said) to Baghdad.

(3) The following financial assistance should be given to the Company whose tender is accepted:—(i) An annual payment for three or five years in consideration of the services rendered to the Empire; the amount of this payment can only be settled after the tenders have been received and examined. (ii) A guarantee for five years of a small percentage on capital invested.

C.

As a further stage, when the conditions in Turkey in Asia make it possible—

(a) Tenders should be invited for both a weekly and a daily service (i) from Constantinople via Baghdad to India; or (ii) from Alexandretta via Baghdad to India, if the French route to Alexandretta has been developed; (iii) from London to Constantinople or Alexandretta.

(b) State assistance will be necessary for these extended routes.

D.

(1) The Indian Government should be asked as to the amount of financial and other assistance they would be prepared to give to a commercial undertaking operating an air mail service to India.

(2) The Colonial Office should also be asked as to the extent of the assistance that they could give in view of the advantages to Iraq.

Mr. G. Holt Thomas, in signing the report, makes the reservation that, in his opinion, the laying-out and equipment of the aerodromes should be in the hands of the operating company, provided the work is done under efficient Government control. Lieut.-Col. Sir Frederick Hall, representing Lloyd's, signs the report with the reservation that he sees no reduction in insurance premiums in sight at present. He suggests that the Government should grant a small sum annually for the assistance in compiling data regarding

machines and their makers, and also full information regarding the flying personnel, so that insurance companies and underwriters may be in a position to judge more clearly the actual nature of each individual insurance.

Lieut.-Col. Mervyn O'Gorman, representing the Royal Aeronautical Society, in a lengthy appendix, deals with some of the scientific and technical aspects of the Imperial Air Mail Service. He points out that the problems relating to the establishment of such a service as that contemplated may be approached from two different points of view, both justifiable but leading to widely diverging procedures. The first of these is summed up in the statement that "the best way to start is simply to begin." The advantages of this procedure are that of getting in first, before other countries, keeping existing types going, and developing them on the service; getting existing pilots work to do so that they will not drop out of flying; and that much will be learnt, whether the attempt succeeds or fails, which could not otherwise be known, or if it were, would not be appreciated. The second method, Lieut.-Col. O'Gorman points out, takes the view that there is much which requires close scrutiny and scientific work. This view claims that the air mails are just as much an engineering and scientific enterprise as the Brooklyn Bridge, demanding the determination of a number of maxima and minima before success can be forecasted. Among the advantages offered by the second method are the urgency of economy in capital, economy in pilots, economy in non-paying load, and the urgency of getting first, before other countries, into possession of the premier technical position in the science of self-supporting aerial transport.

Lieut.-Col. O'Gorman then proceeds to give examples of the class of question that arises under each of the last four headings. Under economy in capital he points out if we assume 100 m.p.h. cruising speed and 500 lbs. of mails, the question arises what is the optimum length of stage and what the desirable aeroplane. By increasing the stage length from 3 hours to 3½ hours the number of aerodromes is decreased, and the aeroplane will not cost much more, while the service will be accelerated. Increasing the stage length results in a certain measure in economy in pilots, unless the stage is increased to a point where the pilot is due to be fatigued. In this connection the question of speed enters into the problem. Col. O'Gorman states that there is no magic in the figure chosen of 100 m.p.h. This is a sensible first estimate, but not necessarily the best figure. He points out that at 100 m.p.h. 60 h.p. is required for each 1,000 lbs. of gross weight, while at 120 m.p.h. this figure becomes 97 h.p., and at 140 m.p.h. it is as high as 140 h.p. The sacrifice of fuel for the extra 20 m.p.h. is large, although there is the big advantage that the 3½ hours' stage covers 420 miles instead of 350 miles, and the fatigue of pilots, he states, has been found to be based on a time factor, not on a speed factor. As much as 33 per cent. of loss of endurance is ascribed to the unsilenced engine, and then there is the mental fag due to persistent attention to compass course and ground tracks in the desert. Lieut.-Col. O'Gorman is of the opinion that all these difficulties can be removed if a determined assault is made on them. Thus he points out that flight by compass without continual attention is possible by azimuth gyro control of rudder, provided the necessary scientific work is pressed on. Thus the bill for pilots can be reduced, provided that scientific work is proceeded with, not as at present with an axe, but with the utmost energy.

Economy in fuel and oil and engine dead weight are susceptible of enormous improvement, in the opinion of Lieut.-Col. O'Gorman, provided the work is endowed. He also thinks that the stable aeroplane is wanted the more for air mails as the length of stage must be made as large as possible. Throughout the appendix by Lieut.-Col. O'Gorman, the need for research is emphasised, and he suggests that, as all the work will not be entirely extra to present research, £100,000 set aside for the purpose would suffice.



Moscow-Berlin Non-Stop

IN connection with the splendid non-stop flight from Moscow to Berlin made by the German pilot, Joachim Styllbrock, some time ago, carrying the Russian representative in Berlin, M. Krestinski, and two Government officials, it is of interest to recall that this machine was fitted with a Rolls-Royce engine. The Fokker R4 covered the distance of 1,800 kilometres (1,115 miles) in 18 hours, or at an average speed of 62 m.p.h. The machine travelled over the towns of Vyasma, Smolensk, Vitebsk, Polotsk, Dunaberg, Kovno, Königsberg, and thence to Berlin. The opinion of the pilot as regards the Rolls-Royce engine is expressed as follows in the *Vossische Zeitung*: "I had the firm conviction that I

should arrive safe and sound in Berlin the same evening, and now that I have succeeded in this I have to thank not least my smooth-working 360 h.p. Rolls-Royce engine, which, up to the present, has been running like a chronometer." (The pilot has so far made the trip between Königsberg and Moscow fourteen times behind a Rolls).

French Gliding Competition

UP to the present no very prolonged flights have been made at Clermont-Ferrand, the average durations obtained being from 1½ to 2 minutes. The weather has been unfavourable, and it is hoped that the next few days will show an improvement. There have been a few crashes, fortunately without serious consequences.

THE LARSON TENSIONOMETER

A PROBLEM of considerable importance in aircraft construction is that arising from the tension of the wires and cables employed for bracing. The tension of these wires must, we need hardly point out, be of the correct magnitude in each particular case, otherwise—apart from mal-alignment—the initial stresses in the structure may be increased with a resulting lowering of the factor of safety. A faulty adjustment of a bracing wire has been known, on more than one occasion, to result in an accident, more or less serious. It is desirable, therefore, to find a means of ascertaining the amount of tension in any particular wire, and it is with this object in view that a very ingenious instrument has been produced in America, known as the Larson Tensiometer—a description of which appears in our American contemporary, *Aerial Age*.

This instrument consists of a frame about 10 ins. in length with two supports, a fixed distance apart, between which the wire is adjusted. Midway between the supports, and operated by hand levers or grips, is a plunger which deflects the wire from its normal position.

The action of deflecting the wire compresses a calibrated spring, and a dial indicator, called the load dial, measures this compression, and indicates the tension in the wire. A second dial indicates the deflection of the wire to the nearest .001 of an inch.

The theory upon which the instrument is based is as follows:—If a wire, under tensile stress, is deflected from a straight line, a system of three concurrent forces, consisting of the tensions in the two segments of the wire on either side of the deflecting force and the lateral force, is formed. The system is in equilibrium, and if the forces and the magnitude of one are known, the magnitude of the other two can be found. In the operation of this instrument the wire is deflected a certain prescribed amount, hence the angles between the forces will be constant and the deflecting force will be proportional to the tension in the wire.

The instrument is made direct reading by graduating the load dial so as to read the tension in the wire instead of the compression in the plunger spring. The sensitiveness of the instrument depends upon that of the load and deflection dials. Operating with a deflection of 0.1 in., a direct reading may be obtained correct to 0.001 in., or 1 per cent., whilst the load dial reads directly to the nearest 10 lbs.

To obtain the highest degree of accuracy on some of the larger sizes of wire the readings must be corrected for two reasons. Firstly, the tension in the wire is slightly increased when it is deflected from a straight line; and secondly, the wire offers a resistance to deflection because of its stiffness as a beam. Both of these tend to make the indicated load too large, but the corrections are of such a nature that they can readily be made when constant deflection is used. The increase in stress due to deflecting the wire from a straight line depends upon the sectional area and the length of the wire, and upon the rigidity of the supports to which the wire is attached.

Using the standard deflection, and assuming the supports to be rigid, it may be expressed by the formula $p = \frac{60,000 A}{L}$

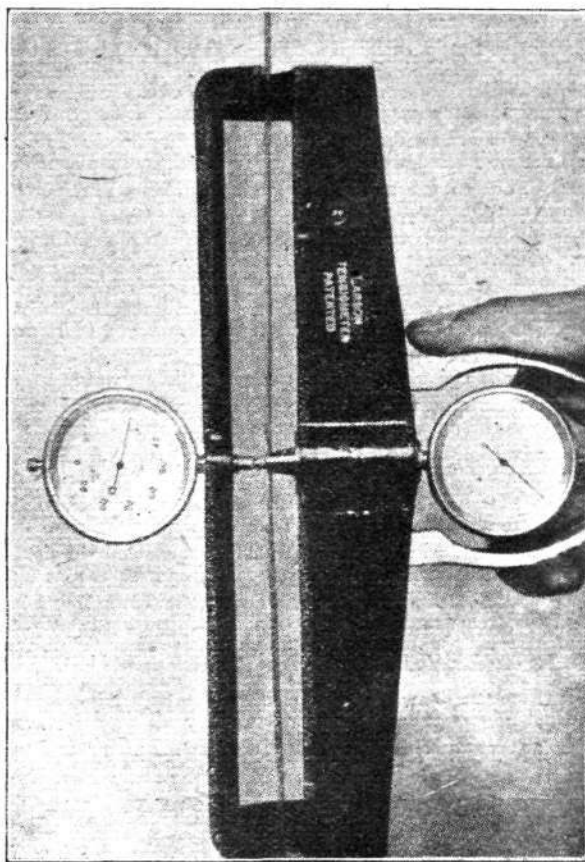
in which p is the increase in total load (lbs.), A is the area of the wire (sq. in.) and L is the length of the wire. It will be seen that this increase is small for conditions met in practice. Furthermore this formula is based on the assumption that the ends are held in rigid supports. Any yielding of the structure to which the wire is attached will reduce the effect so that for aeroplane purposes this correction can generally be neglected.

The increase indicated load caused by the stiffness or beam action of the wire depends upon the amount of end restraint at the supports of the instrument and upon the section modulus of the wire. The end restraint depends upon the tensile load on the wire. With no load the wire acts as a simple beam, and as the tension of the wire increases, the action approaches that of a fixed ended beam. The section modulus of the flexible cables is an uncertain factor, hence a theoretical consideration of this problem is impracticable, and the only satisfactory method of determining the proper corrections is to calibrate the instrument on the various sizes of wire and cable upon which it is to be used. Calibration curves are

available for most sizes of wire, both circular and streamline, and for all sizes of cable in use on aeroplanes.

As found from these curves, the corrections for all cables up to $\frac{1}{8}$ -in. are negligible, and for cables from $\frac{1}{8}$ to $\frac{1}{4}$ in., and for all sizes of round solid wires, the corrections vary with the size of cable or wire, but not with the tension in the wire for loads above 200 lbs. For cables above $\frac{1}{4}$ in. the corrections vary slightly with the load as well as with the diameter of the wire, if the standard 10-in. instrument is used. A longer instrument on these large sizes of cable would materially reduce the corrections necessary.

Although corrections are required on a number of the sizes of wire and cable in use on aeroplanes, the instruments can be made direct reading by setting the load dial for the correction of the size of wire or cable upon which the observation is being made. The dial readings will then indicate the actual load on the wire near enough for all practical purposes. A plate giving the dial settings for the various sizes of wire is attached to the instrument.



The Larson Tensiometer, for measuring the tension in wires and cables

These instruments have also been used in connection with sand loading tests on 'planes and other research work, and for such work in which greater accuracy is desired, the calibration curves may be used to determine the load corresponding to any given reading.

In operation the instrument is never attached to the wire, but is simply placed in position, as shown in the accompanying illustration, and the hand grips brought together until the deflection dial makes one complete revolution (0.1). The reading on the load dial will then indicate the tension in the wire. When using the instrument on wires or cables for which corrections are required, the load dial is adjusted by turning the face to the proper zero for the particular size of wire. The actual tension in the wire is then read on the load dial in the same manner as if no correction were needed. The time required to take a reading is only a few seconds, so that a complete set of readings on a 'plane may be taken in a very short time.

U.S. Government Machines in Pulitzer Race

IN connection with the Pulitzer Race to be flown in October, the U.S. Army Air Service has placed orders for seven Pursuit machines with American firms, believing that the machine which is a good racer will also possess qualities desirable in a Pursuit type. Two machines have been

ordered from the Curtiss firm, two from the Loening Corporation, and three from the Lawrence Sperry Company. The engines to be fitted are respectively: Curtiss C.D.12 (375 h.p.), Packard (600 h.p.) and Wright H.3 (390 h.p.). Although nothing definite is known at present, there is a possibility of the U.S. Navy also entering machines.

LONDON TERMINAL AERODROME

Monday evening, August 14.
PASSENGER traffic is now "booming" to such an extent that it is probable all records will be broken this week. Up to Sunday night between 500 and 600 air travellers had passed through the passport office on the aerodrome, and this number would have been larger still but for the inclement weather in northern France on Sunday. So large was the number of travellers wishing to fly from Paris to London on Sunday that the Daimler Airway despatched three machines from Croydon in the morning, instead of their usual one, in order to bring back passengers from Paris; while Handley Page Transport sent two machines for the same purpose.

The machines had to leave Croydon comparatively empty, as the tide of traffic now appears to have set in from the other side. Booking agencies attribute this to the bad weather, which they say has caused a general curtailment of holidays on the Continent, and made people hurry home sooner.

British Air Travellers Increasing

An analysis of the passenger traffic shows that the number of British travellers is increasing steadily. A year ago the average of British to "aliens" was as small as 10 per cent., but last week quite 33 per cent. of the travellers were of British nationality. This is a most encouraging sign, as it is probable that, if the figures could be obtained, a large proportion of the British passengers would be found to be business people who realise the advantage of air transport.

The clergymen who were travellers by Instone last week do not appear to have had much effect on the luck of the Line in the way of forced-landings. Perhaps Major Greer's methods will be more effective.

On Saturday a Vickers "Vulcan," flying from Brussels to Croydon, piloted by Mr. Bradley, ran out of petrol when near Warlingham, and, as owing to the bad weather Mr. Bradley was flying about 100 feet from the ground, he had no time to choose his landing-ground and ran into a hedge, wrecking the machine. His four passengers were, however, uninjured, and Mr. Bradley escaped with nothing worse than a cut on the hand, which was so slight a bandage was unnecessary. On Sunday the new D.H. 34, G—EBBW, which the Instone Line took delivery of on Saturday, set off for Paris, but was compelled to descend at Marden owing to a broken oil-pipe. She flew back to Croydon later. The Instone sheds had an empty appearance on Sunday owing to the fact that all the machines which could be spared from the Brussels service were in Paris ready to bring back a record booking of passengers.

New Way of Ending a "Night Out"

At 2 a.m. one morning during the week a motor-car arrived at the aerodrome containing four jovial spirits who demanded to fly to Paris immediately. They had been having a "night

out" and had, on the spur of the moment, decided to end up with a night flight to Paris. They were informed that no night services were running, but that the first machine away would be the Daimler newspaper express at 5.30 a.m. They were nothing daunted by the wait, and settled down in their car for a nap, eventually embarking on the 5.30 a.m. machine. They returned on the 5.30 p.m. Daimler from Paris, very well pleased with their trip.

The Messageries Aériennes' service to Marseilles was to have started this week, and to run on Monday and Friday. As, however, there have been no bookings the London-Paris section has not been run, but this will be put into operation as soon as passengers are forthcoming. The Messageries have been having bad luck with their newspaper machines during the week, and on Sunday the machine which left Paris in the early morning was amongst the "crowd" held up at Berck.

Progress in "Airway" Wireless

ONE of the "F.2's" of the K.L.M. has been fitted with wireless in Holland, and has been flying between Amsterdam and Rotterdam for some time. Signals from this machine, which was working with ground stations in Holland, have been picked up clearly by the operators at Croydon. In fact, the whole of the wireless has been improved to such an extent that it is quite a common occurrence for the Croydon operators to be in touch with a machine the moment it has let out its aerial after ascending from Le Bourget. The wireless-equipped "F.2" flew from Amsterdam to London on Friday, this being the first time a Dutch machine with wireless has flown to Croydon, and probably the first time a wirelessly-equipped machine has flown on this route.

The Grands Express were apparently determined to go one better than carrying little five-year-old George Risser, for on Saturday they had amongst their passengers a baby only eight-months-old. It was a pity that no enterprising pressman was able to get the baby's impressions of flying.

The work in the passport and immigration office has become so great that the C.A.T.O.'s were unable to look after it in addition to their usual work on the aerodrome, and a special immigration officer is now in charge. In addition there is, of course, the Scotland Yard man who sees that no undesirables go out, while the immigration officer performs a similar function with regard to those attempting to get in.

The Surrey Flying Services were busy again during the week-end with their popular 5s. joy-rides. Both Capt. Muir and Mr. Youell were fully occupied on the Clerget and Renault Avros, mainly owing to the efforts of Mr. C. J. Chamberlain, who is now employed by this Company to assure the crowds which gather in the public enclosure that flying is quite safe. Incidentally, the Surrey Flying Services staff should be able to compile an amusing book on the silly questions and comments of would-be and actual joy-riders.

On Monday, a record day, there were as many as 170 passengers in and out of the air-station, including the 64 American girl-students from Paris, who were brought over in eight Instone machines—one or two of these 'planes, by the way, delayed by bad weather in France, alighting at Croydon after dark, and by the aid of the night-lighting.

It is interesting to note that 151 of Monday's 170 passengers travelled in British machines; also that on this record day there were as many as 41 "air expresses" passing to and fro along the airways between London and the Continent.

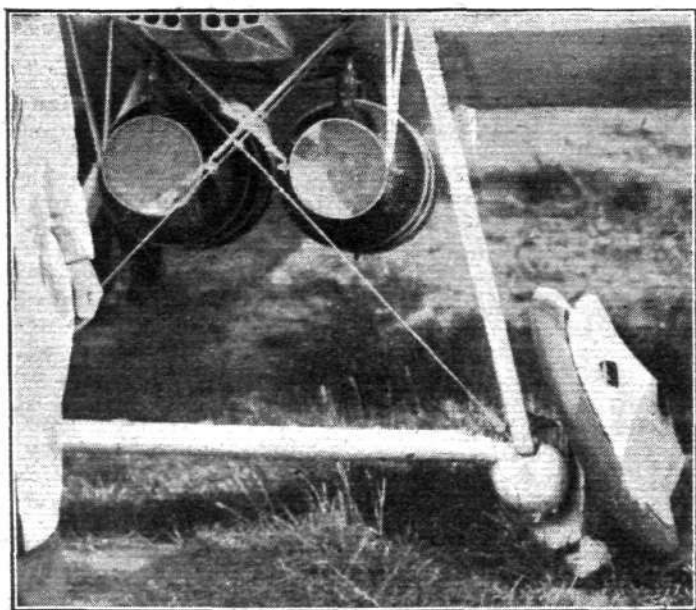
Another item of special interest on Monday was the chartering at the air-station in the evening of an "air-taxi" by a fare who, having his family on holiday down at Hythe, desired to rejoin them speedily after an urgent visit to town.

On Sunday—it now transpires at the moment of writing—Capt. Muir took up as many as 400 "joy-riders."



The Derby Handicap

WE have been requested to correct a mistake in the double-page advertisement of the Gloucestershire Aircraft Co. which appeared in last week's issue of FLIGHT. It was stated that the "Mars I" with Napier "Lion" engine was winner of the Derby of 1921, doing fastest time and handicap, and again winner of the Derby, 1922, fastest time and handicap. It will be remembered that last year the "Mars I" was actually winner of the Derby and first in the Handicap. This year, of course, the Mars I. won the Derby, but was third in the Handicap. The Bristol Monoplane, with 100 h.p. Bristol "Lucifer" engine, was first in the Handicap, and the Bristol "Bullet," with 400 h.p. Bristol "Jupiter," was second in the Handicap. In our table of times, etc., on p. 451, the relative positions both in the Derby and in the Handicap were correctly shown.



"Flight" Copyright.

All that happened: When, on alighting after winning the Derby, Mr. James was in danger of running into a crowd of people (who ought not to have been there), he effected a masterly "save" by swerving to the right. His left tyre, as a consequence, came off, but otherwise nothing happened.

THE ROYAL AIR FORCE

London Gazette, August 8, 1922

General Duties Branch

Wing Comdr. C. R. S. Bradley, O.B.E., is restored to full pay from half-pay; July 28. Wing Comdr. G. P. Grenfell, D.S.O., is placed on half-pay, Scale A; Aug. 1. Flying Offr. J. H. Huxley, D.F.C., is transferred to the Reserve, Class A; Aug. 4. Flying Offr. S. Hobbs is placed on the Retired List; Aug. 1. Flt. Lt. R. S. Smith relinquishes his short service commn. on account of ill-health contracted in the Service, and is granted the rank of Major; Aug. 10.

Stores Branch

Flying Offr. N. Dainty is granted a permanent commn., with effect from Sept. 12, 1919, retaining his present substantive rank and seniority, and is transferred to the Stores Branch with effect from June 17, 1920. *Gazette* Sept. 12, 1919, appointing him to a short service commn. is cancelled.

Memoranda.

Hon. Sec. Lt. E. R. Bauchop relinquishes his honorary commn. on joining the Army; June 5. The permission granted to Lt. W. R. Northridge to retain his rank is withdrawn on his joining the Army.

ROYAL AIR FORCE INTELLIGENCE

The following appointments in the Royal Air Force are notified:—
Flight Lieutenants.—E. F. Turner, from R.A.F. Depot (Inland Area) to R.A.F. Base, Leuchars (Coastal Area). 13.7.22. The previous notification wherein this officer was posted from R.A.F. Depot to No. 10 Group Headquarters is cancelled. R. F. Durrant, A.F.C. The previous notification wherein this officer was posted from No. 10 Group Headquarters to School of Naval Co-operation and Aerial Navigation is cancelled. A. Durston, A.F.C., from Seaplane Repair Base (Mediterranean) to Headquarters, R.A.F. Mediterranean. (Supernumerary.) 1.6.22. T. H. K. MacLaughlin, from No. 2 Squadron, No. 12 Wing (Ireland) to R.A.F. Depot (Inland Area). (Supernumerary.) 5.7.22. G. W. Allen, from R.A.F. Depot (Inland Area) to Marine and Armament Experimental Establishment (Coastal Area). 25.7.22. A. E. Jenkins, from R.A.F. Depot (Inland Area) to No. 1 Flying Training School (Inland Area). 12.7.22. C. F. Pitt, from Armament and Gunnery School (Inland Area) to No. 39 Squadron (Inland Area). 28.7.22. J. C. Osburne, M.B., from Research Laboratory and Medical Officers' School of Instruction (Coastal Area) to No. 1 School of Technical Training (Boys) (Halton). 24.7.22. P. J. Barnett, M.C., from No. 47 Squadron (Middle East) to R.A.F. Depot (Inland Area). (Supernumerary.) 5.7.22. A. E. Barr-Sim, M.B., from Headquarters, R.A.F., India (India), to Aircraft Park (India). 14.5.22. E. E. Isaac, M.C., from Research Laboratory and Medical Officers' School of Instruction (Coastal Area) to R.A.F. Depot (Inland Area). 24.7.22. J. A. Perdrau, M.D., from No. 1 School of Technical Training (Boys) (Halton) to R.A.F. Depot (Inland Area). 31.7.22. E. N. E. Waldron, from R.A.F. Base, Gosport (Coastal Area) to Stores Depot (Iraq). 18.7.22.

N. Keeble, D.S.C., D.F.C., from School of Technical Training (Men) (Inland Area) to Boys' Wing (Cranwell). 25.7.22. F. W. Walker, D.S.C., A.F.C., from School of Naval Co-operation and Aerial Navigation (Coastal Area) to Seaplane Training School (Coastal Area). 15.8.22. C. H. B. Jenner-Parson, from Seaplane Training School (Coastal Area) to R.A.F. Base, Leuchars (No. 205 Squadron) (Coastal Area). 15.8.22. E. G. Hopcraft, D.S.C., from Seaplane Training School (Coastal Area) to R.A.F. Base, Leuchars (No. 205 Squadron) (Coastal Area). 15.8.22. J. W. B. Grigson, D.S.O., D.F.C., from R.A.F. Base, Leuchars (No. 205 Squadron) (Coastal Area), to Seaplane Training School (Coastal Area). 15.8.22. G. H. Reid, D.F.C., to R.A.F. Depot (Inland Area). (Supernumerary.) 16.7.22. Frederick Petch, M.B.E., from Headquarters, R.A.F., Iraq, to R.A.F. Depot (Inland Area). (Supernumerary.) 11.6.22. H. A. Tillman, M.D., to Research Laboratory and Medical Officers' School of Instruction (Coastal Area) on appointment to Temporary Commission. 18.7.22. J. H. W. Fitzgerald, from Central Flying School (Inland Area) to No. 11 Wing Headquarters (Inland Area). 1.8.22. A. N. Bengel, from R.A.F. Depot to No. 5 Flying Training School (Inland Area). 1.8.22. C. L. P. Mullany, from No. 1 Armoured Car Company (Middle East) to Egyptian Group Headquarters (Middle East). (Supernumerary.) 4.5.22. J. H. Simpson, from Palestine Wing Headquarters (Middle East) to Headquarters (Iraq). 28.6.22. E. E. Isaac, M.C., from R.A.F. Depot (Inland Area) to M.T. Repair Depot (Inland Area). 25.7.22. G. H. H. Maxwell, M.B., from No. 39 Squadron (Inland Area) to R.A.F. Depot (Inland Area). (Supernumerary.) 1.8.22. J. Wren, from Headquarters Middle East Area to Aircraft Depot (Middle East). 28.4.22.

WRITING IN THE SKY

Something more than an Advertising Stunt

THERE can be few readers of *FLIGHT*—at any rate, among those who live in London—who have not seen and admired the ingenuity of the new "sky-writing," by which a trail of smoke, emitted from an aeroplane, is made to trace some name, word or phrase in the sky, where, under favourable atmospheric conditions, the smoke remains in shape for several minutes, clearly visible to the thousands who watch it from the crowded streets below. The first word to be written in this way was "Castrol," the name of the famous lubricating oil which is used almost exclusively in aero engines and in numberless other petrol motors. The most recent occasion on which this word appeared in the sky was on August Bank Holiday, just as Gen. Brancker was presenting the Cups for the Aerial Derby at Waddon.

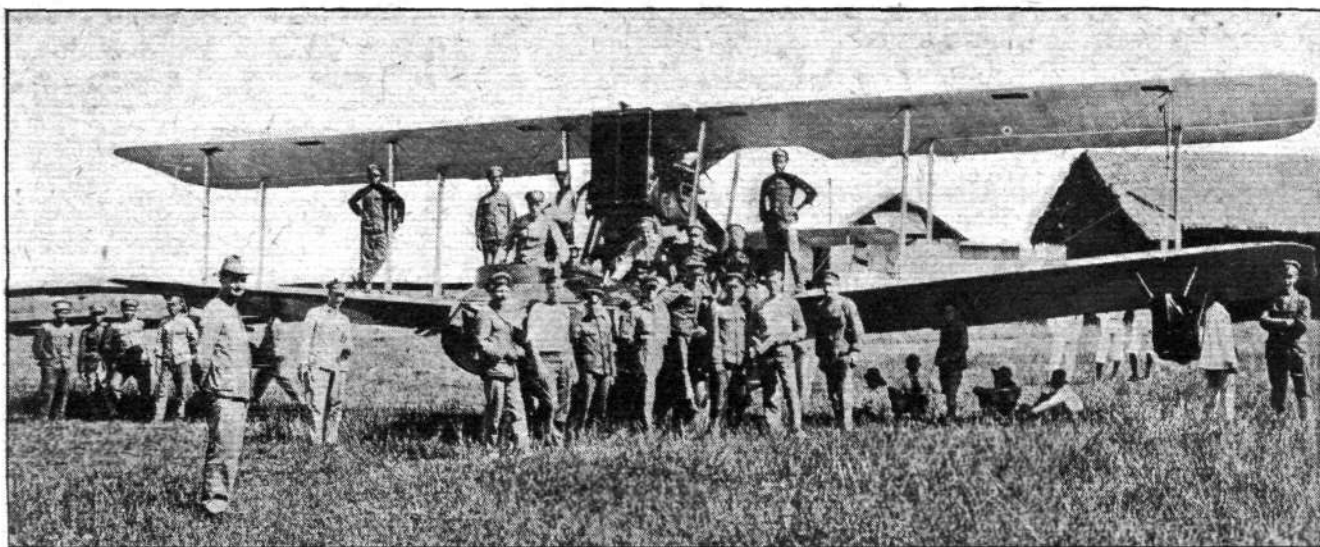
It would have been of interest to describe in detail the apparatus by means of which the smoke is produced, but Maj. J. C. Savage, the inventor of the apparatus, has requested us to refrain from giving details, as certain Patent questions still remain to be settled in foreign countries where the invention is being covered. Suffice it to state that the smoke-producing apparatus depends for its action upon chemical reaction. The resulting smoke trail is allowed to escape from the rear portion of the fuselage of the machine, and the apparatus is so designed that it causes no danger from fire. In its present form the apparatus is the outcome of several years of experimentation and the expenditure of large sums of money on perfecting the details. The invention has now reached a stage where not only is the smoke trail dense and clearly defined, but it is so constituted that it hangs for a considerable time before dissolving, unless a very strong wind is blowing at the time.

As the written words are within eyesight range from an area of some 100 square miles, the number of people who see it every time must be enormous, the "publicity value" being therefore of great moment. We frankly confess that if the new invention represented nothing more than an advertising "stunt" we should not feel inclined to devote space to it in our columns, but if one studies it in greater detail it will be discovered that a number of interesting possibilities suggest themselves. Thus, to begin with, even regarding the invention purely as an advertising medium, there can be little doubt that, from its novelty and attractiveness, this form of bringing home to the public the advantages claimed for this or that commodity will rapidly become popular, thereby necessitating the employment of a number of pilots, who will thus be able not only to make a living, but will be keeping their flying hands at top efficiency. From a national point

of view this is of the greatest importance, and it may well be that in the next few years as many pilots will be employed on this work as are now engaged on the London-Continental air services. Not only so, but ground staffs, engineers, etc., will be given occupation, machines will be in use and engines will be required. Thus it may be expected that quite a little industry will spring up, which will give useful work to many, and which will, moreover, sustain public interest in and familiarise flying.

The possibilities of Maj. Savage's invention do not, however, end there. One can easily conceive of the smoke trail being used for sending out code messages in Morse, and thus another form of signalling has been added to those already in existence for military and naval use. As a matter of fact, in the early part of this year Major Savage did a series of experiments for the Air Ministry on Morse signalling, hiding aircraft in flight, formation of coloured smokes, tracing the path of aircraft in flight during such manoeuvres as looping, rolling, spinning, etc., and also in the use of tiny smoke filaments released around the aeroplane in order to show the actual behaviour of the air flow over its various parts.

It therefore appears possible that these smoke trails may prove of the greatest value. For instance, small jets of the smoke, allowed to emerge in front of a flying aeroplane and travelling back over its various parts, may, if observed or, better even, photographed and cinematographed from another machine, teach us a very great deal about such things as downwash, slip-stream effect, eddies around projecting parts and so on. Already the smoke trails, used for the relatively minor purpose of advertising, have indicated peculiar breaks in the trail during sharp curves, such as occur when the pilot is describing the letter O. Little hooks are always observed to form from the smoke ring, and these occur at such regular intervals and are of such uniform shape that they must be connected with vortices around the machine, probably around the wing tips. Thus quite a new field of investigation is opened up, and to our way of thinking the great value of the invention lies along lines such as these. Lateral control at large angles of incidence might be usefully investigated in this way: the experiments should not be unduly difficult, nor should the cost involved be beyond the capacity of our research votes. Thus, while believing that the first regular application of the invention will be for advertising purposes, we are looking forward to the time when official support will be given to enable use to be made of Maj. Savage's brilliant idea in the interests of aerodynamical science.



A VICKERS VIKING IN JAVA: Gradually the uses of amphibian seaplanes increase as the advantages are realised. Recently Vickers sent one of the Vikings (Napier Lion) out to Java, where it has caused the greatest interest. Our photograph shows the machine surrounded by the mechanics who erected it. Needless to say, the civil population took the opportunity afforded of inspecting one of the latest types of aircraft, and the admiration was general.

IMPORTS AND EXPORTS, 1921-1922

AEROPLANES, airships, balloons and parts thereof (not shown separately before 1910). For 1910 and 1911 figures see "FLIGHT" for January 25, 1912; for 1912 and 1913, see "FLIGHT" for January 17, 1914; for 1914, see "FLIGHT" for January 15, 1915; for 1915, see "FLIGHT" for January 13, 1916; for 1916, see "FLIGHT" for January 11, 1917; for 1917, see "FLIGHT" for January 24, 1918; for 1918, see "FLIGHT" for January 16, 1919; for 1919, see "FLIGHT" for January 22, 1920; for 1920, see "FLIGHT" for January 13, 1921; and for 1921, see "FLIGHT" for January 19, 1922.

	Imports		Exports		Re-Exportation	
	1921.	1922.	1921.	1922.	1921.	1922.
Jan. ...	4,459	1,152	87,128	76,552	2,285	23
Feb. ...	2,379	567	59,829	69,129	19	1,100
Mar. ...	14	1,471	118,199	166,607	1,565	100
April ...	1,370	3,846	138,983	139,995	450	5,880
May ...	3,350	2,416	59,624	167,999	1,818	4,254
June ...	5,181	816	79,713	129,137	—	14,530
July ...	540	1,039	530,628	24,405	860	—
	17,293	11,307	1,074,104	773,824	6,997	25,887

Instone Air Line

MAJOR S. T. L. GREER, A.F.C., who until recently represented the Air Ministry at Croydon Aerodrome, has been appointed General Manager of the Instone Air Line.

The I.C.A.R. Meeting at Rotterdam

WE would remind our readers that the International Concours Aviatique, Rotterdam, takes place from September 2 to 17, 1922. There is no entry fee, but entries for all the various competitions must be sent to the Secretary of the I.C.A.R. Voormalig Raadhuis, Stadhuisteeg 1, Rotterdam, before August 25. Prizes to a total amount of £3,500 will be given, and in addition (out of a limited fund of £460) a fee of 1s. 6d. per kilom. flown from the home aerodrome to Rotterdam will be paid to entrants of foreign machines who undertake to take part in the whole meeting. Rules and regulations may be obtained by application to the Secretary.

Like Father Like Son—and Daughter

IN connection with ballooning and parachute displays, there is probably no more familiar name than that of Spencer. Now both daughter and son of Mr. Henry Spencer are graduating in the same direction. At Cambridge the other day, Miss Ena Spencer, *aetate* 16, and Fred. Spencer, 14, ascended with their father, and at 2,800 ft. high Ena dropped off, and at 3,200 ft. Freddie liberated himself.

They both landed with perfect ease about $1\frac{1}{2}$ miles from where they started. They represent the fourth generation; their father, their grandfather (Mr. Charles Spencer), and their great-grandfather (Mr. Edward Spencer) being well-known aeronauts of their days.

REPORT FROM THE SOCIETY OF MODEL AERONAUTICAL ENGINEERS

London Aero Models Association

HEADQUARTERS, 20, Great Windmill Street, Piccadilly, W. 1. Meetings held every Thursday at 7.30 p.m.

It is hoped that members of the various committees will attend as often as possible so that all business may be settled before the next Annual General Meeting, and thus enable the newly-elected officers at that meeting to get to business straight away with their programme for the ensuing twelve months. On Sunday, July 30, Mr. D. A. Pavely made a record flight of 53 seconds with his compressed air-driven model, Mr. Houlberg and Mr. Rippon being the official observers.

On Sunday next, the 20th inst., members will congregate on Wanstead Flats at 11 a.m., when many members are hopeful of putting up new records.—Hon. Secretary, A. E. Jones, 48, Narcissus Road, West Hampstead, N.W. 6.

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motors. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1921

Published August 17, 1922

- 1,223. J. W. RAPP. Spar-beams or ribs. (157,311.)
- 1,224. J. W. RAPP. Aeroplane spars. (157,312.)
- 11,368. H. E. S. HOLT. Parachute apparatus. (182,245.)
- 13,338. LUFTSCHIFFBAU ZEPPELIN GES. and P. JARAY. Lighter-than-air craft. (183,292.)
- 15,506. G. McALPINE. Means for facilitating landing of aircraft. (183,317.)
- 17,794. D. A. HULL and C. ANTES. Screw propellers. (183,344.)

FLIGHT

The Aircraft Engineer and Airships

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